VALUING CHRONIC MORBIDITY DAMAGES:
MEDICAL COSTS, LABOR MARKET EFFECTS,
AND INDIVIDUAL VALUATIONS

Final Report on EPA Cooperative Agreement
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Chapter 1

OVERVIEW OF THE PROJECT

INTRODUCTION

On September 1, 1987, Resources for the.Future entered into a Cooperative Agreement with the Office of Policy, Planning, and Evaluation, USEPA (CR-814559-01-0) for a project titled "Valuing Chronic Morbidity Damage." This project was to be completed by the end of the first budget period, March, 31, 1989. Subsequently, the deadline for this project was extended to July 1, 1989.

Three major tasks are to be completed for this project:

o Estimation of per person medical costs of specific chronic conditions (chronic obstructive lung disease and coronary heart disease)

o Estimation of the effects of the same chronic conditions on labor force participation and earnings

o Estimation of the willingness to pay to avoid the risk of all other consequences of chronic disease (for chronic respiratory conditions only).[1]

The first two tasks have now been completed, while the approach to the third has been significantly altered and is now being implemented.

This interim report will discuss the methods and results associated with the first two tasks and the activities and plans for conducting the third task. Specifically, Chapter 1 provides an overview of our approach

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1.These would include the costs of altering leisure activities, the costs of averting behavior, the value of the pain and anxiety that the disease entails, and the cost of premature death.

and briefly discuss the problems encountered in implementing our proposed research plan and subsequent modifications to the research project; Chapters 2 and 3 describe the research approach and results for the two completed tasks: estimation of the medical and the labor market costs of chronic morbidity from microdata sets. Finally, chapter 4 presents a discussion of the progress and plans for the remaining research.

Overview of Approach

Epidemiological and toxicological studies suggest that air pollution may increase the incidence of various chronic diseases. Particulates and ozone have been associated with chronic bronchitis and emphysema, and lead and carbon monoxide with coronary heart disease.

In spite of the importance of these diseases, little is known about their social costs. Estimates have been made of medical costs and foregone earnings (from work-days lost, but not from nonparticipation or lower earnings), but they are not based on disease-specific information on individuals. Apart from the recent work of Magat, Viscusi, and Huber (1988), nonmarket costs (pain, premature mortality, and the like) have been completely ignored. In addition, it must be recognized that government policy can change only the probability of contracting a chronic disease. Thus, the appropriate measure of the social cost of a disease should be based on what a person who does not have the disease would be willing to pay to reduce his probability of getting it. The sum across individuals of these willingnesses to pay, plus the expected costs of the disease that are not borne by individuals, comprise the theoretically correct measure of social benefits from reducing the incidence of the disease. Moreover, the implied social cost of a chronic. disease is computed analogously to that for premature mortality as the average individual willingness to pay for a given reduction in the risk of chronic illness divided by the magnitude of the risk reduction. Thus, if the average WTP is $100 for a bronchitis risk reduction of 1 in 1000, the implied individual average cost of a statistical case of bronchitis is $100,000. Medical costs per case not borne by individuals and labor market costs that an individual might not

associate with such diseases but might nevertheless exist would then be added to this figure.

One method of measuring ex ante willingness to pay is to ask persons who do not have a chronic disease what they would be willing to pay to avoid 'it. It is our contention, however, that this approach is unlikely to provide useful information unless a person is very familiar with the consequences of the disease. To give an intelligent answer to such a question, a person with no history of a chronic disease would have to appreciate the pain and anxiety that such a disease would cause, would have to envision the effect it would have on his ability to work and to pursue leisure activities, as well as the medical costs and lost wages that it would entail. Moreover, he would have to disentangle the portion of medical costs that he would pay from total medical costs, and would have to determine the extent to which lost income would be replaced by transfer payments. The individual would have to imagine these effects not only in the present, but throughout the course of the disease. Finally, he would have to understand the effect of the disease on his life expectancy and the manner in which he would die.

Because we do not believe that uninformed persons can provide a meaningful answer to an ex ante willingness to pay question, and because we must value the social costs of medical treatment and lost productivity not reflected in individual willingness to pay, we take a different approach to the measurement of disease costs. First, we measure the actual medical and labor market costs of chronic disease using large micro datasets. When considered over a lifetime, these avoided costs are part of the cost of a case of the chronic disease. The expected medical and productivity costs avoided when the probability of contracting a chronic disease is decreased by Δp is simply Δp times these costs for a case.

Second, to value the nonmarket effects of a chronic disease, we had originally intended to ask persons **with** chronic obstructive lung disease to answer an ex ante willingness to pay question to value these elements of costs independently of medical and labor market costs. Additionally, we intended to ask questions about the villingness to pay for the probability

of a cure. and to use these responses to estimate state-dependent utility functions for income (Viscusi and Evans, 1988). The latter could then be used to estimate ex ante valuations of a change in the risk of chronic lung disease.

Unfortunately, a variety of theoretical and empirical difficulties led to a change in the project scope in two major respects. We had originally intended to measure medical costs by age of onset; however, the variable for "age of onset" identified in the microdata set for medical costs turned out to be a dummy variable indicating whether the disease started before or during 1977-78. This information is less than ideal for estimating life-cycle medical costs. To obtain estimates of costs by age and age of onset, we were forced to regress an onset dummy, along with the variables for age, sex, and race, on medical costs rather than regressing age of onset and the other variables on medical costs.

Second, regarding the contingent valuation survey, subjects with chronic respiratory disease had great difficulty answering open-ended WTP questions in the pretest, both questions about a cure and questions asking what they would have been willing to pay to reduce their probability of contracting chronic bronchitis before they had the disease but with the knowledge about the disease they now have. Given these empirical problems and the theoretical difficulties associated with the use of questions about the WTP for a chance of a cure, we changed our approach. We now intend to apply the MVH computer-assisted risk-risk survey to a sample of "healthy" relatives of people with chronic respiratory disease and derive risk trade-offs suitable for ex ante valuation of risk of chronic bronchitis. Our results will then be compared to those of MVH to test the hypothesis that familiarity and experience (albeit second-hand) with chronic respiratory illness affects responses. In addition, using severity measures of the disease taken from the chronically ill sample and perceived severity measures taken from the relatives, we intend to examine hypotheses about the relationship of risk-risk trade-offs to disease severity and hypotheses about the reliability of severity perceptions.

Scope of the Analysis

Medical and labor market costs are presented for the following diseases:

- o hypertension (ICDA codes 401-404)
- o ischemic heart disease (ICDA codes 410-414)[2]
- o nonspecific heart trouble (ICDA code 429)
- o chronic bronchitis (ICDA codes 490-491)
- o emphysema (ICDA code 492).

These cost estimates are a significant improvement over existing "cost of illness" estimates and provide a lower bound to the total social costs of chronic illness.

To measure medical costs and labor market effects, we relied on data from two national surveys, the 1978 National Medical Care Expenditure Survey (National Center for Health Services Research, 1981) and the 1978 Survey of Disability and Work (Social Security Administration, 1982). The National Medical Care Expenditure Survey (NMCES) collected data on all medical costs incurred during 1978, by disease category, for 40,000 persons. These data are the best source of medical costs by disease currently available. They were obtained from individuals and checked against reports from the suppliers of medical services; thus, they are more accurate than patient-reported figures alone. Furthermore, they include all components of medical costs, not only those costs paid for by patients.

The effects of chronic disease on labor force participation and earnings is measured using the 1978 Survey of Disability and Work (SDW). The survey, which was designed to examine issues relating to eligibility for disability benefits and the effects of disabilities on labor force

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2. Ischemic heart disease, which includes myocardial infarction, angina pectoris and coronary atherosclerosis, occurs when plaques on the coronary arteries diminish the supply of blood to the heart. It is responsible for 90% of deaths due to heart disease (National Heart, Lung and Blood Institute, 1978, quoted in Oster et al., 1984).

participation, consists of two samples, a stratified random sample of 6,853 persons from the 1976 Health Interview Survey, and a sample of 4,886 persons from the population of recipients of Social Security Disability Insurance who were declared eligible for benefits no earlier than 5 years before the survey. Our sample consists of 2,218 men between the ages of 18 and 65 from the Health Interview Survey portion of the Social Security Survey.

The SDW dataset is sufficiently rich that we were able to obtain information on the labor market effects of various chronic diseases by current age and age at onset of the disease. The present value of the costs of chronic illness clearly varies according to age at onset of the disease. To compute the present value of costs by age at onset we must know how yearly costs vary with current age and age at onset of the disease.

As noted above, the risk-risk analysis will focus on chronic bronchitis, because this is the disease addressed by MVH, as well as the respiratory conditions found in our chronically ill sample.

Chapter 2

MEDICAL EXPENDITURES AND SERVICES UTILIZATION

The medical costs of a chronic disease are the costs to society of the detection, treatment, and rehabilitation of the disease, as well as a portion of research, training, and facilities costs. In this chapter measures of medical expenditures[1] and services utilization for five target diseases are presented: hypertension, ischemic heart disease, non-specific heart disease, chronic bronchitis, and emphysema. These measures were computed from self-provided cost of treatment data for persons in the National Medical Care Expenditure Survey of 1977-78. Because the data are specific to individuals with chronic diseases, the costs of detection are not included. In addition, because medical care providers are a minor source of research and medical training, these cost components are likely to be greatly underestimated (if included in overhead charges) or ignored completely.

The cost measures developed in this chapter contrast sharply with those provided by the National Heart, Lung, and Blood Institute (1982), which produces the most widely used estimates of medical costs. The National Heart, Lung and Blood Institute allocates aggregate hospital costs and doctor costs to diseases based solely on a disease's proportion of total hospital days and total doctor visits, respectively. This approach has two shortcomings: (1) it assumes that the average cost of a hospital day or doctor's visit is the same for all diseases, and (2) it does not allow one to distinguish medical costs by age or by sex.

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1. The terms "costs" and "expenditures" are often used as synonyms. However, the former refers to social costs while the latter refers to private costs. The latter may include transfer payments, for example, which would not be considered a social cost. In addition, use of the term "cost" implies that the prices of goods being costed out are competitively determined and, therefore, reflect marginal productivities. In general, and specifically for medical goods, prices deviate from marginal social cost. Nevertheless, in this report, the two terms are used synonymously to refer to "expenditures."

An alternative "engineering" approach is to multiply the number of hospital days or doctor visits attributable to a condition by the typical price for a hospital day or typical price for a doctor visit for that condition (see e.g., Freeman (1976)). This approach circumvents the first objection raised above but not the second. In addition, the "typical price" may be based on prices obtained from several providers in one or more cities and, therefore, may not reflect the average price of medical services over the U.S.

Our approach addresses both problems by using data on medical expenses and services utilization collected from a sample of individuals. Thus, the reported use of services and the associated expenses, as well as the source of the payments to cover the expenses can be examined directly and used to generate total expenditures as well as average expenditures per person. Further, the prices used in our study are those faced by a representative random sample of people drawn from the entire U.S. Further, staff at NMCES developed a set of population weights to appropriately extrapolate expenses from those in the sample to the entire U.S. population.

This chapter is divided into three major sections: data development, estimates of annual costs per case and related results, and estimates of lifetime costs per case.

DATA DEVELOPMENT

This section describes the NMCES survey, the problems encountered in using it, the approaches adopted to use it, and the sample characteristics.

The National **Medical** Care Expenditure Survey

To estimate the medical costs of chronic respiratory and heart disease we used The National Medical Care Expenditures Survey (NMCES), sponsored by the National Center for Health Services Research (1981). NMCES presents data on health care utilization and expenditures for approximately a one year period for 14,000 households selected randomly from the civilian noninstitutionalized U.S. population. Each of these households was

provided with a calendar diary for recording their use and cost of medical services.   Each was interviewed six times over this period, with responses in prior periods provided to the household for verification. The household survey was supplemented by a survey of physicians and facilities that provided medical care to persons in the household sample period and by a survey of employers and insurance companies responsible for the health insurance coverage of responding households. Weights are provided in the survey to transform expenditures of the sample to population expenditures.

Diagnostic-specific data were collected on the utilization of all types of medical services, the use of drugs, and in-home and nursing home care and on the cost of these services and products.   Specific chronic (and acute) health problems were identified. and linked to the use of services and products .   All conditions contributing to the utilization of particular health services and their costs were identified by the respondents, who also allocated these costs to specific conditions, where possible.

Details of the Data Set

The main data set was created from two files: the Personal Interview File (PID file) of personal and family characteristics and the episode file containing information on episodes of acute and chronic conditions.   The PID file is a public-use person-level file with 40,320 records (i.e., persons).   Each record has 250 variables. These variables summarize information available from more detailed **files,** one of which is the episode file.   A subset of the 40,320 persons included in the survey had medical events (visits to doctors, hospital stays, purchases, etc.), or disability days, or had physical or mental conditions which limited the kind or amount of activity they could do.   These events and conditions occurred because of health conditions (accidents, diseases, impairments, operations, etc.). Respondents were asked to name the conditions involved. The interviewer kept a list of all conditions named. Whenever a new condition was mentioned, the respondent was asked questions about it.   Attachment A presents the page of questions triggered by every medical event, disability day or health limitation associated with a new condition. The answers to these questions gave rise to the second file, the episode file.   The

episode. file has 106,518 episodes of illness from 32,067 persons. It has 215 variables. **As** a person is in the episode file only if **a** medical expense **or** utilization of medical services was reported, over 8,000 **people** had no medical expenses or utilized no services. Because episodes are coded in a complex way on this file (see below), the episode count is far higher than the actual number of episodes.

Of the 106,518 episodes, over 11,000 are identified as resulting from an accident (as opposed to a disease or from other causes) and were, therefore, dropped from our study. Another 35,000 were dropped because they are identified as being acute conditions. This leaves some 60,000 episodes that probably are related to chronic conditions.[2] Medical expenses, service utilization, and all other episode-related variables were taken from analyses with the 60,000 episode sample. Complex procedures were devised for appropriately treating duplicate and overlapping records to avoid double counting (see below).

Definition of Target Diseases

The target diseases were defined using The International Classification of Diseases (seventh edition, the edition relevant to the 1977 survey). Table 1 (all tables appear at the end of the chapter) gives the codes used in defining the target diseases, as well as the number of persons in the sample with such diseases, by disease category.[3]

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2. **Following** the protocols of the Health Interview Survey, 'a condition was defined as chronic when either a person had the condition for at least 3 months prior to the survey or the condition was one of a set of conditions that are always defined as chronic (such as emphysema).

3. **In** addition to using the ICDA codes to build the basic data set, a screen for 'not caused by an accident' and 'not acute' was used. Only 50 persons were affected. Most of these were persons whose episodes of bronchitis were indicated to be acute.

Multiple Conditions

The sub-categories of the above table do not add to the total because, as one might expect, people.can have more than one of the target diseases. Table 2 shows some of the combinations of disease in the sample. A circulatory combination is a combination of two or three of the target circulatory conditions: hypertension, ischemic heart disease, and non-specific heart disease. A respiratory combination is a combination of the two target respiratory conditions: emphysema and chronic bronchitis. Note that there are only 5 persons with these respiratory combinations. Most people who have both of the respiratory diseases also have a circulatory disease (usually hypertension). They appear therefore in the last category of persons, those with both circulatory and respiratory conditions. [4]

Episode Types

An examination of question 2 on the condition page (Attachment A) is important for understanding how the episode file is structured and how we used it. There are five episode types: (1) simple, (2) same as, (3) related to, (4) stand alone, and (5) duplicate. For every new condition mentioned by the respondent, he or she was asked whether the condition was 'related to' or the 'same as' conditions mentioned earlier in the interview or in previous interviews. As many as five conditions could be linked. If the condition was 'related to' other conditions, then, in addition to a record on which the condition would 'stand alone' without the other conditions, another record was created which kept together the conditions which were 'related to' each other. Therefore, 'related to' episodes are always linked with two or more 'stand alone' episodes.

In contrast, multiple conditions on a 'same as' episode require no sub-records since 'same as' (taken at face value) means the conditions are

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4. Note that 'hypertension only' does not mean that a person does not have any other medical problem, impairment, disease, etc. It means that the person does not have any of the other target diseases in which we are interested. The same interpretation is true for the other 'only' classifications.

equivalent, i.e., the conditions are simply different names for the same problem.

If there were no other conditions that were the 'same **as'** or 'related to' the new condition, then that condition remained by 'itself on what is called a 'simple' episode.

Ideally, 'simple', 'same as', and 'stand alone' records would be unique. Any given condition (hypertension, **for example)** would appear on only one episode per person. The episode would be one of those three **types.** [If the condition appeared on a 'stand alone', there would of course be an'accompanying 'related to' record.] However, certain inconsistencies in responses could generate odd relationships among a person's records. A fourth type of episode, the 'duplicate', was created to deal with such problems.

Suppose, for example, that a respondent had two episodes, one with conditions A and B that the respondent said were the 'same **as'** each other, and another with A and C that the respondent said were 'related to' each other. However, he did not give any indication that B and C were related in any way. In this example, the respondent's two responses would generate the following records:

Episode Type	Condition 1	Condition 2
Same as	A	B
Related to	A	C
S tand alone	A	
Stand alone	C	
Duplicate	A	

Because of his response concerning the first episode, a 'same **as'** record with A and B would be created. Because of his second response, two 'stand alone' records would be created, one for A and one for C; and then, because they were 'related **to'** each other, a 'related to' record with A and C would be created, too. To indicate that A appears on two episodes, a

fourth type of episode would be created, the 'duplicate'. A 'duplicate' episode functions as a 'stand alone' episode, with its different name serving as a reminder that there is both a 'related to' episode (as one would expect when there is a 'stand alone') and a 'same **as'** episode with which it can be associated.

For only a relatively small percentage of the sample analyzed did we have any 'duplicates'. The table below indicates the extent of the problem. Nevertheless, we found that in nearly all cases, duplicate records could be ignored in aggregating medical expenses for an individual across their episodes. In the example above, the expenses for condition A would be the sum of expenses on the same as record plus those on the stand alone record with A only.

Percentage of Duplicate Episodes.

Condition	Persons with condition	Percent with 'duplicate' episodes
Hypertension	3479	3.2
Ischemic heart disease	378	8.7
Non-specific heart disease	884	5.4
Chronic bronchitis	430	4.7
Emphysema	222	5.4

'Same **as'** and 'related to' episodes--accuracy of respondents on complex episodes of illness. Analysis of the data involving episode types begs the question as to the accuracy of respondents' assertions that conditions were the 'same as' or 'related to' each other. Casual examination of the conditions grouped together on 'same as' and 'related **to'** episodes showed that, for the most part, the kinds of conditions linked together were reasonable. As another check, we examined whether respondents ever said that circulatory and respiratory conditions, conditions which are seemingly distinct, were the 'same **as'** or 'related to' each other. A large number of such instances would have raised some question about the usefulness of the

'same as' and 'related **to'** episodes. Fortunately, in only two percent of the 'same as' and 'related to' episodes did respondents make such assertions.

No matter how similar to each other the 'same **as'** conditions might be, it should be noted that they were sufficiently different to have been given different ICDA codes. In the light of this fact, it is difficult to consider such conditions as being exactly the same. It is better to treat such episodes as complex ones involving more than one diagnosis. For this reason, and other reasons discussed next, much of the analyses of 'same **as'** and 'related to, episodes is kept separate from each other and from the **'** simple' episodes.

<u>'Same as' and 'related to' episodes--the jointness problem on complex episodes of illness</u>. A problem in computing the total medical costs (or statistics for other variables) of specific conditions is that of jointness. This problem can occur when more than one condition appears on a 'same **as'** or **'** related to' episode. What one would like to know is how costs are allocated to each condition appearing on the episode. For example, if a 'same **as'** episode has both hypertension and another condition on it, and if the total expenditures associated with that episode is $1000, then one would like to know what proportion of that amount is attributable only to hypertension.

Unfortunately, there is no way to resolve problems of jointness for costs (or any other variable) on a 'same **as'** episode. In this case, the respondent viewed these multiple conditions as essentially being the 'same **as'** each other. Therefore, no distinctions between them could be made.

The situation is somewhat more promising for the 'related **to'** episodes. When expenditures during an episode could be allocated by the respondent to specific conditions, the episode was designated as a 'related to' episode and 'stand **alone'** records were created for each condition. Each 'stand alone, record would then contain the costs attributed to the given condition. Put another way, the expenditures on the 'related **to'** record would be simply the sum of the expenditures indicated on the 'stand alone'

episodes.   In this case, there would be no problem in retracing the process to get from the aggregated expenditures on the 'related to' episode to the separate expenditures on the relevant 'stand alone' episodes.

However, jointness can be a problem for the 'related **to**' episodes even if the respondent made a clear distinction between conditions.   Suppose, for instance, that a patient were hospitalized for respiratory and kidney problems.   Such an episode might be coded as a 'related **to**' episode with these two diseases as conditions.   During his hospital stay the patient would incur many charges that might be assignable to one of these diseases. However, some charges, such as daily room fees, could not be assigned to specific conditions non-arbitrarily. In this case, the full amount of the daily fee would be assigned to each of the 'stand **alone'** records.

This approach applies to non-cost variables as well. Disability days, for example, are conceptually difficult to allocate to any one condition when there are multiple conditions involved.   The questionnaire reflects this;   one is simply asked about periods of disability and about the conditions causing such periods.   The episode file reflects the unallocatable aspect of this variable, too.   When one looks at the 'stand **alone'** episodes, it is apparent that for some episodes, the same number of disability days is given to all the conditions contributing to the relevant ' related to' episode.

Because of the jointness problem, information contained on 'same as,' 'related to, or 'stand alone' records has been kept separate throughout much of the analysis.   This problem of jointness reflects the realities of illness.   People have episodes of illness which can be caused by multiple conditions.   Sometimes the characteristics and consequences of an episode of illness can be linked uniquely with one particular **condition, and** sometimes they cannot.

Finally, it is worth noting that, since 'simple' episodes appear with only one condition, they do not involve any jointness problem. Fortunately , most episodes are 'simple.'

'Simple' episodes.   As the name suggests , a simple episode has only one condition associated with it.   There is no problem with jointness. This episode type dominates the analysis.   Table 3 shows that persons in our sample with any given disease often have no more than one 'simple' episode of it.

Single episodes.   In discussing 'simple' episodes above we showed, for any given disease, that most of the people with the disease have only a single 'simple' episode of it.   When persons have a single 'same **as'** episode or a single 'related to' episode with one associated 'stand alone', they may be treated similarly to persons with a single 'simple' episode, in the sense that they have only one episode of the disease to consider. As the coding and interpretation of records with multiple episodes is quite complicated and, for any given disease, 80 to 90 percent of the sample with the disease have only a single episode of it (table **4),** most of the analysis proceeds with the single episode data set, although the three groups of persons comprising it are often broken out: (1) persons with a single 'simple' episode, (2) persons with a single 'same as' episode, and (3) persons with a single 'related to' episode (with a single associated 'stand alone' episode).

Multiple episodes--why they occur.   The above table indicates that most of the analysis can be conducted on persons for whom there is only one single episode to consider (ergo, only one single record to analyze). Nevertheless, a substantial subset of the sample (10 to 20 percent across disease categories) had multiple episodes.

There are three reasons why multiple episodes can occur.

1) Intermittent episodes.   Because the survey took place over the course of a year , and because an episode of illness can start and stop within such a relatively long period, it is possible for a person to have multiple episodes of illness caused by the same condition.   Given that we are focusing on conditions which are definitionally chronic, few of the persons in our sample have more than one episode associated with any one condition. However, because it is possible for a person to have a chronic disease with

intermittent episodes of the disease, there will be persons who have multiple episodes within the year.

2) Similar ICDA codes. Because we defined a disease as a range of ICDA codes, it is possible for two conditions on a 'related to' episode to generate two 'stand alone' episodes which appear to be the same condition. They are similar only in the sense 'that they are similarly coded.

3) 'Duplicates'. As discussed above, when there is a 'duplicate' episode, a condition will appear on two records. [Usually these will be a 'same as' and a 'related to'.]

Multiple episodes--adding up. The major problem with multiple episodes is that information must be added up across episodes. Note that one can easily add episodes of the same type together. For example, expenditures from two or more 'simple' episodes can be added. [Exception: variables like 'disability days' on 'stand alone' episodes.] There are some problems in doing this: dealing with missing values for one or more episodes, dealing with the sequencing of 'related to' and 'stand alone' episodes, dealing with the above-mentioned problem arising from two condition with similar ICDA codes on 'related to' episode. But these are all resolvable (albeit complicated) programming problems. There are no conceptual problems in adding up a person's episodes of the same type.

However, after separately adding a person's 'simple', 'related to', 'same as', and 'stand alone/duplicate' episodes, we then have to decide whether and how to add these secondary sums together. The issues here are' the same ones faced in the larger 'singles' analysis. Case-by-case analyses'were made to appropriately aggregate across episodes.

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5. It is worth noting that these multiple episodes could be of any type and mixtures of types. For example, one 'simple' episode of hypertension might be followed by a complex episode involving an additional condition. It is also worth noting that if there are two or more 'related to' episodes and the information which is included on the associated 'stand alone' episodes does not change, then only one 'stand alone' episode appears (after the first 'related to' to which it refers).

Two. problems.   There are a few cases included in the group of multiples not because they give rise to multiple episodes but because they require special treatment (as do the multiple episode people).

1) Conflicting accident/chronic indicators. In a few cases (less than **10),** persons would indicate on a 'related to' episode that the episode was of an acute nature, but the accompanying 'stand **alone'** episode was indicated to be chronic.   Such a person gets into our sample because of the **'stand alone'** episode.   **We** decided to ignore the information on the 'related to' episode.

2) Stand alone 'Stand alone'.   In a few cases (around **25),** there were persons who had a 'stand alone' episode without the expected 'related to' episode. Although we do not know why this happened, we used the information available on the 'stand alone' where appropriate.

Structure of the episode file

The structure of the episode file reflects the existence of the different episode types.   The episode file is arranged by person. All of a person's episodes appear in sequence.   For each person all episodes are sequenced by episode type, with all 'simple' episodes first, followed by all 'same as' episodes, followed by sets of 'related to' and 'stand alone' episodes.   The 'stand alone' for any particular condition on a series of 'related to' episodes appears only once;   it appears after the 'related to' episode in which it is first referenced.   'Duplicate' episodes can appear in the same places as do 'stand alone' episodes.   A 'duplicate' episode functions as a 'stand alone' episode would.

Formation of analysis groups.   Persons' episodes were distributed to various groups which, for some of the analysis, remained separate. We first grouped episodes into two major groups defined by the number of episodes we had to analyze per person.   One group--singles--comprises the single episodes of the persons for vhom there is only one episode to analyze.   **The** other group--multiples--comprises the episodes of the persons for whom there are more than one episode to analyze. Table 5 indicates the number of episodes in each group, by disease.

Table 6 presents the same information for persons and **represents our** sample in terms of the number and type of episodes to analyze, by disease. Each cell is one of our analysis groups. There are twenty groups.

Summary of derivation of our analysis file

The above discussion provides the definitions, concepts, and problems involved in developing the episode file into a file suitable for analysis. Below is a summary of that development.

1. We formed the episode file 132,064 persons, 106,518 episodes].

2. We pulled off all the episodes of all the illnesses of anyone who has at least one episode with a target condition on it. Target conditions were given by the ICDA codes associated with hypertension, ischemic heart disease, non-specific heart disease, chronic bronchitis, and emphysema **[4,839** persons, 24,938 **episodes].**

3. We deleted 50 persons because all of their episodes with conditions in which we are interested were either caused by an accident or were indicated as being acute. Frequently these were persons with acute bronchitis. **[4,789** persons, 24,727 episodes].

4. We pulled off episodes involving the diseases in which we were interested. **[4,789** persons, 7497 episodes]

5. We then grouped our sample's episodes into 20 groups defined by disease and type of episodes and by whether or not there were more than one episode of the disease per person.

Context of main analysis--the larger picture

Table 7 presents information which puts our sample into a larger context. The table presents weighted and unweighted 'numbers which show, first, how the sample fits into the larger picture of the entire NMCES sample and U.S. population, then how it fits into the larger group of . persons with illness, and then finally how it fits into the larger group of persons with any chronic disease.

NMCES is a household-based survey, thus allowing one to characterize a household by the presence of someone in the household with illness, chronic illness, or one of our target diseases. Therefore, in addition to the

information on individuals, the table also presents information on households.

From the information in the table one can calculate that 1 in 9 persons in the U.S. has at least one of our target diseases and that 1 household in 4 has someone in the household with such a disease.

The bulk of this chapter will consider only single episode cases. The costs associated with these episodes are easy to obtain from the data. The more complex, multiple episode cases generally are more difficult to handle. At the same time it is not clear, a priori, if cases of intermittent, as opposed to continuous, episodes would involve larger or smaller costs. Thus, these more complex cases are examined separately. Then, the single and multiple episode sub-samples are brought together to present statistics on medical expenses for the entire sample.

Aggregation

Research of this type should be able to produce **comprehensive estimates** of per person expenditures by disease. Because of the complexities introduced by episode types, it is necessary to aggregate expenditures of different types together to arrive at an overall cost estimate. Ideally, this aggregation should reflect the frequency with which a condition in a given type of episode appears in the general public. The data base contains population weights sufficient to extrapolate these cost estimates for the sample to the general population (based on age, race, and sex).

The aggregation scheme used in this study is simply to compute statistics for each condition based on the set of records for the 'simple,' 'same as,' and 'stand alone' episode types. The 'related to' episodes are simply ignored to avoid double counting 'stand **alones'** and adding costs associated with non-target diseases.

RESULTS

We are interested primarily in the total medical costs associated with five target diseases, and secondarily interested in costs by age group and sex (to obtain some information on lifecycle costs). Because of the

complexity of categorizing episodes of chronic illness, these diseases are also differentiated by episode `type.` Multiple episode cases are treated separately.

In the first section, which deals with persons with single episodes, the average medical expenditures per person for the five target conditions is presented by episode type for the survey period (1977-78). Standard deviations, maximum values, and means conditional on non-zero expenses are also provided. Further detail by age and sex is given next. Then, the aggregate per person costs by condition are presented, with average costs computed from the set of people with 'simple,' 'stand alone,' and 'same as' episode types. These aggregate cost estimates are then disaggregated in two ways -- by the type of costs incurred and by the source of the payment. Then, population-weighted costs are presented for the same target conditions. Finally, measures of service utilization and measures of distress by target condition are presented.

The second section presents results for the sample with multiple episodes. And the third section presents results for the, combined samples.

RESULTS FOR SINGLE EPISODE SAMPLE

Unweighted Expense Per Person by Disease and Episode Type

Table 8 provides estimates of mean medical expenses, along with standard deviations and maximum expenses, by condition and episode type. Irrespective of episode type, those with ischemic heart disease incurred the highest annual costs: $621, $2,253, $1,236, and $959 for simple, same `as,` related to, and stand alone type episodes, respectively. The least costly target condition was chronic bronchitis. As might be expected where conditions are not differentiated by severity, standard deviations of expenses are large relative to the means. In all cases, the standard deviation exceeds the mean, sometimes by two or three times, or more. Maximum expenses are usually more than ten times the mean, and may be as much as forty-two times as large. The conditional mean, that is the average expense when those with the disease but without any expenses are

dropped'from the sample, of course, exceeds the unconditional mean, but the differences are small.

Comparison of Expenses Across Episode Type. The most striking feature of table 8 is the large difference in average expense across episode types for each condition. Expenses for simple episodes are far less than those for the other types (with the exception of bronchitis), and again, with the exception of bronchitis, average expenses for 'same **as'** episodes exceed those for 'related to' and 'stand **alone'** episodes. By definition, 'stand alone' expenses are less than those for 'related to' episodes.

One explanation for these differences may be that episode types are surrogates for severity. For example, one could expect that, on average, simple episodes would be generally less severe than "related **to"** or "same **as"** episodes, because the latter two imply that multiple conditions were being experienced. Therefore, expenses should be larger for the latter episode types.

To explain why the "stand alone" expenses exceed those for "simple" episodes requires additional conditions under the severity hypothesis: namely that severity increases more than linearly with the number of conditions and this non-linearity is great enough to more than offset any joint cost savings in the treatment of multiple conditions. If severity increases more than linearly with additional conditions, then each condition within the complex of conditions would be more severe than the same condition for a person with a "simple" episode. If, in addition, there is little jointness in treating multiple conditions, then a condition appearing in a complex episode would be more costly to treat than when it appears in a simple episode. The cost for treating the **"stand** alone" condition, therefore, could be expected to exceed the cost of the same condition in a simple episode.

Further Detail by Sex and Age. Because the incidence of these diseases varies by sex and age, the expenses of treating them are also likely to vary over these characteristics. Tables 9 (males) and 10 (females) show

these expenses for the four episode types and tables 11 and 12 provide average expenses by sex and age for simple episodes only.

The main observation is the large difference in average expenses by sex for some conditions and the small differences for others. For instance, expenses are very close for simple episodes of hypertension – $96 vs. $106 for males and females, respectively – and quite different for simple episodes of ischemic heart disease – $807 and $335 for males and females, respectively. For some episode type/condition combinations, these differences doubtlessly arise from small sample sizes. Yet, for the above examples, sample sizes vary from 77 to more than 1500.

The main observation across ages is that the distribution of average expenses across age groups appears to depend on the condition. For hypertension, expenses are fairly constant across age groups, irrespective of sex. However, for the other conditions, expenses are much-larger for one or two age groups than the others (excluding age groups with very few observations). Hales in their sixties incurred higher expenses than those in other age groups for ischemic heart disease and emphysema, those in their sixties and seventies incurred the highest costs for non-specific heart disease, and those in their seventies incurred the highest costs for bronchitis. The sixties appear to be the age group incurring the highest costs for females across many of the conditions, with the exception of bronchitis, where (excluding one person who was in her eighties) those in their seventies incurred the highest expenses.

Unweighted Average Expenses Per Person Aggregated over Episodes

Average expenses per person by condition can be computed over the entire sample by aggregating over episodes. This is done by using the set of 'simple', 'same as', and 'stand alone' episodes in the averaging process. This approach provides a unique and comprehensive estimate of average expenses for people with single episodes of the target diseases. As above, cells with few observations are excluded from the discussion.

Table 13 shows, as might be expected, that average expenses are highest for those with ischemic ($888) and non-specific ($707) heart disease, and lowest for those with chronic bronchitis ($82). Given the relationship between expenses for 'simple' episodes and those for other episode types, the average expenses for each condition are higher than those for 'simple' episodes and lower than those for episodes of the other types shown in table 8 (with the exception of chronic bronchitis).

The distribution of expenses is also of interest, as a few cases of high expenses can skew the average, as can many cases of low expenses. Table 14 gives frequency distributions for each of the target conditions. There are a large number of episodes with zero costs, ranging from 6.2 percent for hypertension to 23.8 percent for emphysema. Fifty percent of the episodes involve total costs under $100, with some conditions reaching the 50 percent mark under $50. At the other extreme, the most expensive one percent of the episodes begin at only $3000 for hypertension and $1000 for chronic bronchitis, but at $20,000 for ischemic and non-specific heart disease (with emphysema intermediate at $5,000).

Uses of Expenses

It is of interest to know how these expenses were allocated across different types of medical services. Table 15 provides this information. The NMCES allocates expenses to three major categories: medical contacts (primarily doctor visits), hospital expenses, and drugs. There are several minor categories that are omitted from the table.

As would be expected, hospital expenses were the largest category of expenses for all conditions, even when people with no hospital expenses were included in the averaging computation. The maximum hospital expenses per person exceeded $20,000 for the heart diseases and were in the $10,000 range for the other target diseases. Expenses on medical contacts were the next largest category of expenses for all conditions.

It is also apparent from table 15 that these three expense components are the primary components of total expenses. Only about ten percent of

the sample had total expenses exceeding the sum of the three major components, and the amount of excess ranged only from under $2 to just over $10 (not shown).

Sources of Expenses

The NMCES provides information on five sources of funding for medical expenses: family, medicaid, medicare, personal insurance, and other. The sources of funding are of interest in their own-right, of course. But, in addition, the identification of funding sources is necessary for the broader analysis of the social costs of chronic illness. The contingent valuation portion of the study asks people for their willingness-to-pay for reduced risk of chronic illness. In theory, this bid should take into account the medical costs of the condition paid for by the family, but not those costs borne by others. Thus, the portion of expenses paid by others (appropriately adjusted for the risk reduction) should be added to the bid as part of the social cost of each of the target conditions.

Table 16 identifies these funding sources by condition. There is a surprising degree of difference between the conditions in their funding sources. For hypertension, which is perhaps the least serious of our target diseases, family funding dominates, accounting for about 36 percent (**$55/$151**) of total expenses.'   For the other conditions, this source is much less important, ranging from 13 percent for non-specific heart disease to 27 percent for bronchitis. Personal insurance is the most important source of funding for ischemic heart disease (46 percent), reflecting the high proportion of expenses for the hospitalization component and the high degree of coverage afforded this type of expense by health insurance plans. The insurance share for emphysema is large (28 percent) for much the same reason. Coverage for non-specific heart disease, the condition with the least family funding, is not dominated by insurance. Rather, because the population with this condition tends to be older than that for ischemic heart disease, the largest funding share comes from **medicare** (36 percent).

6.There are no missing values. Therefore, the mean of the total expense equals the sum of the mean expense source components.

Finally,. it is curious that **medicaid** funds less than one **percent** of expenses for ischemic heart disease while funding from 7 to 17 percent of the expenses for the other target conditions.

Additional insight into the distribution of funding sources can be obtained by computing for each individual the percentages of funding received from various sources and then averaging these percentages across individuals for each source. As can be seen, the average-percentages for the family source (in brackets) are much higher than the aggregate percentages for the family source (in parentheses), the former ranging from 52 to 70 percent, while the latter ranges from 13 to 36 percent. This difference implies that relatively large numbers of people have episodes with small expenses that they pay for themselves. This may reflect deductibility clauses, the exclusion of drugs from coverage for some policies, or other factors.

Aggregate Weighted Expenses

Table 17 provides the average expenses for the U.S. civilian noninstitutional population by condition for people with single episodes only. Table 7 showed that 24.4 million people have at least one of the target conditions. The information on table 17 covers **22** million people with only single episodes of at least one of the target conditions.[7,8]

The population-weighted expenses are similar, but not identical to, those for the sample (provided in table 8). Expenses for ischemic heart disease are larger after weighting ($1,010) as are non-specific heart

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7. **The** sample weights were developed by the NMCES survey to project expenses to the population at large. Multiplication of the total population with each condition (as projected by the NHCES weights) by the average medical expenses per person yields the total medical expenses for this population, by condition. These expenses are not comparable to total expenses for the U.S. on these conditions until people with multiple episodes are included (see below).

8. **Because** of the complex procedures used to derive the population weights, the computed standard deviations for weighted estimates of any type are somewhat larger than the actual standard deviations applicable to the population.

disease-and emphysema.   But, per person expenses are smaller for the other target conditions.   Given the population affected, e.g., 831,000 people with emphysema, total medical expenses for these diseases sum to over $6 billion, with $2 billion and $2.5 billion for hypertension and non-specific heart disease, respectively, followed by $1.6 billion for ischemic heart disease, $367 million for emphysema, and $133 million for chronic bronchitis.   It should be emphasized, however, that these estimates are incomplete because of the aforementioned omission of people with multiple episodes.

Services Utilization by type, by condition, weighted

The share of various components of medical expenses, such as money paid to doctors and hospitals as a percent of total expenses, is composed of the price paid for these services and the quantity of service provided. Both prices and quantity of service may change over time. However, given the rapid escalation of prices for medical services, the quantity of service used by disease is apt to be more stable and the more reliable predictor of the medical cost component of the social costs of chronic disease.

Per person statistics on the total number of medical contacts, the number of hospital events, total hospital nights, and average length of **stay,** the number of nursing home nights, the number of doctor visits, and the number of prescriptions are provided in table 18, by condition.   Not shown are the same statistics by episode type.   The latter statistics evidence the same pattern as average expenses, i.e., service utilization for 'simple' episodes is generally less than for 'same **as'** and 'stand alone' episode types.

The statistics presented include the mean, standard deviation of the mean, and the maximum, as well as means conditional on use of the service and (weighted) counts of the number of people using the service [Needs to be added to the table]. For instance, referring to hospital nights, people with an episode of emphysema were in the hospital an average of 1.43 nights with a standard deviation was 4.58 nights and a maximum of 27 nights over at most 3 separate stays (events).   However, only 14 percent of people with

emphysema episodes (129,081/923,775) stayed overnight in the hospital.   For those'who stayed overnight, the average number of nights annually was 10.25.   The average length of stay (computed by dividing annual nights by number of hospital events) was 8.3 days.

Notable observations from table 18 include:

1) Average service utilization is quite similar across conditions, with the exception of prescriptions. The number of prescriptions annually ranges from 2.4 for bronchitis to 8.4 for ischemic heart disease;

2) Conditional average service utilization varies much more. Hospital nights range from 9 for bronchitis to 16 for non-specific heart disease , while length of stay varies from 6.9 for bronchitis to 12.2 for non-specific heart disease.

3) Doctor visits range from two to five over the conditions. Surprisingly, emphysema generates the largest number of visits. Even so, only 43 percent of persons reporting an episode of emphysema visited the doctor for this condition.

<u>Measures of Distress, by condition, weighted</u>

In addition to medical expenses, the social costs of chronic illness include the willingness-to-pay of those with the disease for an end to the adverse consequences of their condition. Objective measures of many of these consequences are illusive. But there are several that are rather easily measured and have been monetized in the health valuation literature. . These measures include total disability days and its components -- bed disability days (BDDs), work loss days (WLDs), housework loss days (HLDs), and cut down days (CDDs). BDD's, WLD's, and HLD's can overlap but a CDD is a measure of minor disability days that does not overlap with the other measures.   The first three disability day measures were defined as an effect for "all or most of a day." The length of a "cut down day" was not defined, except to ask how many days "illness caused [you] to cut down on the things you usually do for as much as a day" [my italics].   Note that the definition of this type of effect in the Health Interview Survey requires cutting down for all or most of a day.   The NMCES definition is much looser, appearing to admit any event which affected one's usual activities, no matter how short the duration of the event.   Thus, we would

expect the number of disability days reported in the NMCES to exceed the corresponding measures from HIS, ceteris paribus.

Table 19 presents the population-weighted statistics for those with the target conditions. The summary measure of disability -- total disability days -- ranges from **5** per person for hypertension to 35 for emphysema. Of the components of total disability days, more days are lost from housework (defined as **"work** around the house") than from any other categories, and this holds for all conditions except bronchitis where **BDDs** are the largest of any of the disability measures. This is a surprising result. Depending on the condition, **BDDs** or **CDDs** are the next most prevalent type of disability day, with **WLDs** the least prevalent. Standard deviations around these average values are, again, quite large, and maximum values are all in the triple digits, with one person who registered an episode of non-specific heart disease reporting 365 disability days. Many people reporting episodes of the target conditions had no disability days. At least 25 percent and as much as 75 percent of these people reported no disability days.

Explaining these results is complicated by several factors. First, more men work (outside the home) than women. Thus, women have many fewer **WLDs** than men. However, total disability days is not very different across the sexes even though for most of the other disability indicators women show more disability days than men. This is a particularly striking result for emphysema **CDDs** and **BDDs** and for non-specific heart disease **HLDs** and **BDDs**. Second, housework may be interpreted by some as "women's work" and therefore men may be reluctant to indicate that housework days were lost. The extent to which this is true cannot be gauged. However, reported **HLDs** are nearly identical across the sexes for all conditions combined. Third, age partly determines lifestyle and lifestyle partly determines how a day of distress is reported or whether it is even. recognized and reported as a disability day. However, a casual examination of mean disability days across age groups reveals no consistent patterns. More powerful statistical approaches are needed to fully analyze these results.

RESULTS FOR MULTIPLE EPISODE SAMPLE

In this section, the average annual medical expenses per person, as well as this measure by source and use, are presented for individuals who reported more than one episode of a target condition during the survey year. These expenses are contrasted to those for individuals reporting only a single episode of a target condition. A priori, the relationship between expenses during single episodes and those for multiple episodes is unclear. On the one hand, individuals may report multiple episodes of a chronic condition because they experience relatively symptom-free periods during the year. When their expenses are contrasted with those for people who report a single, uninterrupted episode, one might expect expenses for the latter to exceed those for the former. On the other hand, a single episode does not have to last a year and a multiple episode may imply greater severity than a single episode. For both of these reasons, the expenses associated with multiple episodes may exceed those with single episodes.

Table 20 reports average annual medical expenses by condition and by sex (aggregated across all 'simple,' 'same as,' and 'related to' episode **types).** Referring to the figures for both sexes combined, these costs are lowest for chronic bronchitis, only $223 annually, and highest for non-specific heart disease, $3,321. Standard'deviations are quite large relative to the means and maximum costs are largest for hypertension, at $60,600. Males report higher expenses than females, for some conditions many times higher. Even so, small sample sizes and wide variations in per person expenses within cells make these sex differences statistically insignificant.

With table 20 and table 13, one can compare the results for the multiple and single episode samples. Individuals with multiple episodes of a condition during the year comprise between nine and eighteen percent of the total number of individuals with the condition in the sample. These percentages generally vary directly with severity of the condition, i.e., they are lowest for hypertension and chronic bronchitis and highest for ischemic heart disease.

The differences in costs between the multiple episode and single episode samples are striking and lend support to the severity hypothesis as applied to all five target conditions. That is, average expenses are much higher for individuals reporting multiple episodes (e.g., $2121 versus $409 for emphysema). Further, referring to table 8, which breaks down average costs for single episodes by episode type, average costs for multiple episodes exceed those for 'same as' and 'related to' single episodes. For example, the average case of a 'same as' single episode incurs costs of $1,003 per year versus costs of $2,121 per year for the average multiple episode case.

Although the average differences in costs between these groups are large it might still be the case that a few outliers in the multiple episode sample are responsible for the differences. This hypothesis can be investigated by comparing the frequency distributions in table 23 with those in table 14. From a comparison of the percentages of the sample in each cost cell as well as the medians, it is clear that, for each condition, the entire cost distribution for the multiple episode sample is shifted to the right (towards higher costs) relative to the distribution for the single episode sample.

Tables 22 and 23 report on the sources and uses of expenses for the multiple episode sample and should be compared to tables 15 and 16 for the simple episode sample. Eighty individuals with very complex multiple episodes are omitted from the tables 22 and 23 because of difficulties in computing their source and use shares. However, there is no reason to suspect that the source or use shares of this subsample are substantially different than those for the bulk of the multiple episode sample.

The uses of expenses (table 22) are grouped into three major types: medical contacts (primarily doctor visits), hospital use (both on an in-patient and an out-patient basis), and drugs. Except for chronic bronchitis, hospitalization expenses dominate. Compared to the use shares for single episodes (shown in the last column of table 22), hospitalization is more of a dominant use for the multiple episode cases than for the single episode cases (chronic bronchitis aside), a finding consistent with

the finding noted earlier that total expenses per person for the multiple episode cases outstrip those for the single episode cases.

The sources of funding can be described at the sample level or at the individual level, i.e., at the sample level, as the percentage of average sample expenses funded by various sources or, at the individual level, as the average percentage of funding received from various sources. Viewed across conditions, there are no obvious regularities in funding source shares computed as percentages of the average expense. However, as was true for funding sources in the single episodes sample, the average share of expenses computed from individual shares is heavily weighted to the family source. For instance, fifty-five percent of annual per person expenses for hypertension are paid for by the family, with the next most important funding source being personal insurance, at eighteen percent. Comparing these shares to those for single episodes, the family share is smaller for individuals reporting multiple episodes of any of the target conditions. This relationship probably holds because individuals reporting multiple episodes report higher medical expenses than those with single episodes and, therefore, are more likely to exceed insurance deductibles.

Finally, population weighted estimates of average per person and total expenses by condition for the multiple episode sample appear in table 24. The ranking of conditions by expense per person seen in the sample (table 20) is preserved after population weighting. However, per person expenses are altered by as much as $700 (for ischemic heart disease: $2,912 for the sample and $3,603 for the population). Total expenses (multiple episodes only) are greatest for non-specific heart disease ($2.3 billion per year) and lowest for chronic bronchitis ($55 million).

RESULTS FOR COMBINED SAMPLES

In this section, the single and multiple episode samples are combined to produce statistics on the entire sample and, through the use of population weights, on the population. Table 25 reports average per person and total medical expenses by condition for the unweighted and the weighted samples. Tables 26 and 27 break down these costs by sex and age group.

Tables '28 and 29 provide the overall shares of each funding source and table 30 compares per person costs for individuals living Within and outside of an SMSA.

The weighted portion of table 25 permits computation of the prevalence of the target conditions in the population. Prevalence here is conditional; it refers to the proportion of the total population with a given condition who also reports some medical event (a distress day, a medical expense, the utilization of a service, whether free or not, including telephone calls to the doctor). Thus, to the extent that there are individuals in the population who report having a condition but have no symptoms, utilize no medical services, and report no medical expenses, the prevalence figures reported here underestimate unconditional prevalence.

The first column of table 25 shows that with 212.1 million people in the population, the conditional prevalence (in percent terms) of the target conditions are:

Condition .	Percent Prevalence
Chronic Bronchitis	1.14
Emphysema	0.50
Hypertension	8.28
Ischemic HD	0.97
Nonspecific HD	1.99

Still referring to table 25, the population weighted annual average costs per case range from $85 for chronic bronchitis to $1,450 for ischemic heart disease. Hypertension and even emphysema are markedly less serious (in terms of medical costs) than either of the heart disease conditions.

Sex and age detail on these costs are useful in their own right. But, in the context of the overall study of the social costs of chronic morbidity, we are interested in only certain aspects of these costs,

primarily the expenses for male adults. This group is of special interest because the second component of this project (see Chapter 3) on labor productivity effects of chronic illness focuses on this group. Thus, table 26 presents costs by condition for all males and males 20 years and up. (Table 27 presents the corresponding information for females.)

Mean annual expenses per person (males only) appear to generally increase with age, up to the 60's or 70's for chronic bronchitis, emphysema, and hypertension. However, expenses for those with heart disease (heart attacks) peak in the 40's.

Within this group, we recognize that individuals answering willingness-to-pay questions are unlikely to account for medical costs borne by sources other than themselves or their families. Therefore, table 28, which reports population weighted funding shares for both sexes combined, is complemented by table 29, which reports funding shares for males 20 and over. From table 29, between 32 and 35 percent of per person expenses for the mildest conditions, chronic bronchitis and hypertension, are borne by sources outside the family, while about 50 percent of per person expenses for the other conditions are borne by outside sources.

Finally, from table 30, for each condition except ischemic heart disease, per person expenses of individuals living in SMSA's are larger than those living outside of SMSA's. This could be expected based on the higher cost of living within SMSA's. The reverse result for ischemic heart disease is harder to explain. If the specialized medical services associated with heart attacks are in shorter supply outside of SMSA's (relative to demand), then the price for these services might be higher than those within SMSA's. For expense per person to be larger outside of the SMSA's the demand for medical services would need to be more price inelastic outside of SMSA's, a plausible condition. And this differential would have to be large enough to offset the cost-of-living differentials favoring non-SMSA's.

LIFETIME COSTS OF CHRONIC DISEASE

In this section, the average'present discounted value of a case of chronic disease is estimated along with the non-private, costs of such a case.   The latter is used to add to the implied cost of a case obtained from the survey portion of this project (task III) for an estimate of the social cost of a case of chronic disease.   In this interim report, lifetime (or lifecycle) costs are estimated only for emphysema.   In the final report, costs for the other target conditions will be presented as well, if data permit.

Estimation Approaches

The ideal approach to estimate lifetime costs per case is to conduct a longitudinal study of a large group of individuals beginning at diagnosis and ending at death.   In this case, the estimation of lifetime costs would be straightforward. Unfortunately, such studies would be exceedingly expensive and, to our knowledge, have rarely been done (see below). Alternatively, lifetime data on medical expenditures could be obtained from health insurance companies and used for the same purpose. Unfortunately, these data are closely held and generally are not available to researchers.

A third alternative is to follow an "engineering approach."   This involves deriving estimates of costs from information on the utilization of medical services during the course of a condition and the average price of these types of services.   This approach has several disadvantages. Most important, because the data bases are almost always based on prevalence rather. than incidence, their use requires a series of assumptions about the course of the disease.   In addition, the data bases generally used for this purpose do not report data in sufficient detail to apportion medical service utilization and costs to specific conditions.

For instance, Oster, et al. **(1984),** in estimating the lifetime doctor's costs of emphysema, first calculate the average annual number of physician visits for COPD where emphysema was a diagnosed condition (although not one necessarily related to the **visit).**   Then, they assume that every person

with emphysema sees a doctor once during the year of onset and that "someone who was at the mean time past onset [calculated from survival probability data to be 4.5 years] would see a physician an average number of times per year." With these two points, it was assumed that the number of physician visits increases linearly with disease duration. A cost per first visit of $75 and a cost per additional visit of $30 were assumed after discussing prices per visit with several doctors. Multiplying the appropriate price per visit by the linearly increasing number of doctor visits over time yielded a time stream of costs associated with doctor visits.

The fourth approach, and the one explored in this report, is to use a large microdata set for a cross-section of people of different ages and of different ages of disease onset to construct an estimate of lifetime costs. The major advantage of this approach over the engineering approach is that it requires fewer assumptions about the lifecycle utilization of medical services and embodies actual costs of care rather than those obtained by polling providers.

Cost Algorithm

Both the engineering and the microdata approaches require an algorithm to aggregate the year-by-year cost estimates. The approach followed in this report is based on Hartunian, Smart, and Thompson (1981). It involves multiplying the estimate of medical costs for each age/duration cell by the associated probability of survival at each year past onset, deflated by the discount factor for that year. Symbolically,

$$PVC_1 = \sum_n \frac{P_1(n) * C_1(n+1)}{(1+r)^{n-1}} \tag{2-1}$$

where PVC_1 = present discounted value of medical costs for a person of onset age 1

$P_1(n)$ = the survival probability of a person with age of onset at 1 living to age n [9]

$C_1(n)$ = the medical costs incurred in n

r = the discount rate

Then, the average present discounted medical cost over all ages of onset can be obtained for each condition by weighting the cost associated with each age of onset cohort by the frequency of onset for that cohort (ρ_1) and summing, i.e.,

$$APVC = \sum_1 PVC_1 * \rho_1 \qquad\qquad (2-2)$$

Survival probabilities are available by duration (but not age of onset) from Diener and Burrows (1975), a fourteen year prospective study of survival in 200 patients with COPD. [10] The sample was composed of nearly all white males, with an average age of 59.

The study has two limitations. First, the survival probabilities are truncated after 13 years, the end of the study. Second, no attempt was made by the authors to distinguish between chronic bronchitis and emphysema

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9. We assume that diagnosis occurs at the lth birthdate, P_1 (l=n) is the survival probability for a person of age n-l living to age n (taken from mortality tables), and costs are incurred immediately upon diagnosis.

10. There is some confusion in this study, as well as in the study by Oster et al. (1984) which relies on the Diener and Burrows estimates, about the nature of these survival probabilities. From inspection of the original article describing the study protocols (Burrows et al., 1965) it appears that the survival probabilities refer to age from onset of the study, not age from onset of the condition. This defect in the study design may not be too serious if those in the sample were all recently diagnosed as having chronic respiratory disease. In fact, the authors only included individuals in the study who had a "mild" case, suggesting that the difference between age of condition onset and age of study onset was small. On the other hand, the study presents data for the onset of dypsnea (shortness of breath) which, using an "onset of symptoms" definition for disease onset, suggests that the average age of onset was eight years before the study began. As there are alternative definitions of disease onset (e.g., first diagnosis by a doctor), and

in these patients. Oster et al. assumed that they were all emphysematics. Alternatively, it might be more reasonable to assume that the proportion of the sample'with these diseases would mirror that in the general population (i.e., about a **3.5:1** ratio of chronic bronchitics to those with emphysema). However, as the estimated survival probabilities fall rather steeply with duration of the (unknown mix of) conditions and most accounts of premature mortality risks claim that chronic bronchitis carries much lower risks than emphysema, the above ratio is unlikely to be the one present in this study. Nevertheless, in this interim report it is assumed that the survival probabilities apply to emphysema.

To take advantage of the age detail in our database and because of the truncation of the survival probabilities, a survival function was estimated and used, along with mortality tables for white males, to estimate survival probabilities by both age of onset and duration.

To extend the estimated survival probabilities to a longer maximum duration, a Gompertz distribution[11] was fit by applying non-line& least squares to the observed survival probabilities for the average age of onset in the sample, 59 years old. The cumulative survival function $G(x;k,c)$, where x is age and k and'c are parameters, is **exp{-k/c(exp(cx)-1)}.** The results of the regression run yielded values for k and c of 0.0709 and 0.1023, respectively. With these parameter values, survival probabilities were computed for the 14th to the 20th year past onset.

To derive survival probabilities by duration for other ages of onset, it was assumed that the effect of a chronic condition on survival probability at any year past onset is proportional to the effect of the

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Footnote 10 continued from previous page
one can experience shortness of breath eight years before first diagnosis, it is still conceivable that, for the Diener and Burrows sample, the number of years between the onset of the condition and the onset of the study is small. In any case, a search will be conducted over the next few months for better survival data for emphysematics.

11.This distribution is typically used in mortality data applications.

disease. on survival of the 59 year old from year of onset at 59 to each year thereafter. Or,

$$\rho_{ij} = P_{ij} * \frac{\rho_{59,j}}{P_{59,j}}, \qquad (2\text{-}3)$$

where ρ_{ij} is the cumulative survival probability associated with age of onset i at disease duration j (computed from i), and P_{ij} is the cumulative survival probability for white males computed from i over j years. For example, if an average 59 year old has a probability of living to 61 of 0.96696 (($P_{59,61}$) from the life tables) but with emphysema diagnosed at 59 has a probability of surviving to 61 of only 0.925 (($\rho_{59,2}$) from Diener and Burrows), then an average 69 year old with a probability'of living to 71 of 0.9100 ($P_{69,71}$) faces a survival probability of 0.8705 (from equation 2-3 above, 0.9100 * (0.925/0.96696)) if diagnosed at 69 with emphysema.

Table 31 provides average survival probabilities by duration of disease and age of onset for each year of duration (to 20 years) and seven age groups (O-24, 25-34, 35-44, 45-54, 55-64, 65-74, >74).[12]

In addition to survival probabilities, the age distribution of age of onset is needed for combining lifecycle cost estimates over age of onset groups. These frequencies (ρ_1) are taken from population-weighted frequency distributions calculated from the NHCES database. As age of onset is represented by a dummy variable (onset in 1977-8 or earlier) the distributions include only those with age of onset in 1977-8. Table 32 provides these distributions by condition and reports sample sizes'for each cell.

12.These groupings correspond to those used in Chapter 3.

Average Per Person Medical Expense by Age and Onset Dummy

Finally, data on average medical expense per person by age and age of onset are needed. Table 33 provides these figures by age group and by whether onset is in 1977-8 or earlier. Table 34 presents the same information for white males. This information would be sufficient for estimating lifecycle costs if sample sizes per cell were large. However, as they are relatively small for some cells for each condition, we estimate costs by cell using a regression approach.

Regression Approach

The regression approach involves regressing annual costs per person on age group dummies, an age of onset dummy, sex, and race. Then, for the onset year, costs are estimated for a given age/age at onset cell by setting the onset dummy and the appropriate age dummy to **"1"**. For the year after onset, and every year thereafter, medical costs are computed after setting the age of onset dummy to zero and adjusting the age dummies as appropriate. The resulting series of cost estimates are then averaged by cohort and used in the equation above to compute lifecycle costs. As we are interested primarily in white males, the values for the age and sex variables are set to reflect this cohort in all of the computations.

Tables 35-39 present the regression results for the target conditions using dummy variables for age groups that correspond to those used in computation of productivity effects. ONSETFLG **=1** when the onset of the condition is in 1977-78, zero otherwise. The age dummies **(AGE1-AGE6)** correspond to the cohorts noted above with the 74 and above group omitted from the regression specification. **RACEDP=1** for whites and **=2** otherwise. **SEXDP=1** for males and **=2** for females.

Estimates of Lifetime Expenses

Table 40 presents estimates of the present discounted value of the average lifetime costs of emphysema in white males by age cohort and for all ages. These estimates were computed using a five percent discount

rate. Lifetime costs are largest for the 65-74 cohort, at $5,878 and, curiously, smallest for the 55-64 cohort. Average lifetime costs over all cohorts is $3,732. These estimates are all in 1977 dollars.

Table 41 reports on the results of changing the discount rate used to bring costs for future years of the disease back to 1977 dollars. We use discount rates of 3 and 10 percent: three percent because **Oster** et al. uses this rate and agreement on this rate appears to be emerging among economists and ten percent rate because the Office of Management and Budget requires that this rate be used for discounting. The numbers in the table are the costs estimated with the alternative rate divided by the costs estimated with the five percent rate. Thus, these figures all exceed 1.0 when a three percent rate is used and are less than 1.0 when the ten percent rate is used.

At first glance, the results are surprising: neither doubling the discount rate nor almost halving it have much of an effect on the lifetime cost estimates. Lifetime costs per person using a three percent rate are only 6.5 percent above those using a five percent rate and the costs computed with a ten percent rate are only 13 percent lower than those using the five percent rate.

Nevertheless, these results are readily explained. Irrespective of the discount rate used, year-to-year costs are being heavily "discounted" by the survival probabilities. Relative to the rapid reduction in survival rates as the disease progresses, the effect of discounting costs incurred over the life of the disease is fairly small. For instance, a 44 year old incurs a cost of $870 in the first year. With no discounting and a 100 percent chance of surviving 15 years, costs are estimated to be $375 in the 15th. year. If the estimated survival probability is used, his expected cost in the 15th year is only $31. When this is discounted at 5 percent, the cost is $15. At three percent and ten percent, it is $7 and $20, respectively. Thus, the reduction in costs over time is primarily caused by disease duration (with costs estimated to fall with duration) and the reduction in survival probabilities.

Medical Expense Component of the Cost of Chronic Disease

In this project, the relevant medical expense component of the social costs of illness is that portion of lifetime medical costs that would not be counted by individuals responding to willingness-to-pay or risk-risk questions for reduced risk of developing a chronic disease. In the **Magat-**Viscusi-Huber questionnaire, individuals are told explicitly that medical costs to individuals are negligible because of insurance coverage. In this case, total medical expense per person is the appropriate measure for adding to the other costs. In general, however, individuals may assume that they will bear a portion of their medical costs, even if they have insurance coverage. According to our data for emphysema, 86 percent of the average medical expenses per person are paid by sources other than the family . Thus, in general, the portion of medical expense not covered by direct survey questions is 86 percent of $3,732, or $3,210.

COMPARISON OF RESULTS WITH OTHER STUDIES

Three studies provide cost estimates for respiratory diseases examined in our study. NHLBI (1982) estimate annual costs of chronic bronchitis and emphysema using a " top-down" approach while Freeman et al. (1976) use an engineering approach with aggregate data to estimate annual costs of emphysema. The third study, Oster et al. **(1984),** estimates lifecycle costs for emphysema.

Annual Estimates from NHLBI

The National Heart, Lung, and Blood Institute publishes estimates of the costs of specific chronic illnesses. These estimates are computed using a " top-down" approach (i . e . , where the data manipulation begins with aggregate cost data, in this case, for medical services) rather than the microdata approach used here. The NHLBI estimates for 1979 are provided in

table 42. These estimates are deflated to 1977 **dollars**[13] for comparison to the cost per person and total costs developed in our report. The annual medical expenses per case in 1977 were $118 and $102 for chronic bronchitis and emphysema, respectively. These estimates contrast sharply with those developed in our report. We estimate costs per case of $82 and $600 for chronic bronchitis and emphysema, respectively (table 27). In light of the difference in severity between these two diseases, our cost per case figures are much more in line with expectations.

Nevertheless, it should be noted that because of the top-down nature of the NHLBI cost per case calculation, these estimates are dependent on estimates of disease prevalence. If these NHLBI prevalence estimates are much different than those that we used (from the NMCES data), then one would not expect the costs per case estimates to be similar. In fact, the NHLBI prevalence estimates for these diseases (which are taken from the Health Interview Survey (HIS)) are quite different than the NMCES estimates. The HIS estimates that 3.5 and 1.0 percent of the civilian, noninstitutionalized population of the U.S. in 1979 (216 million people) had chronic bronchitis and emphysema, respectively. Our estimates of prevalence, which are conditional on the occurrence of some medical event (i.e., a restricted activity day, some cost incurred, or some service used (including a phone call to the doctor)) , are 1.1 and 0.5 percent for chronic bronchitis and emphysema, respectively, for 1977.

There are at least three reasons for the difference in prevalence rates: sampling error, use of different base years, and conditionality. Sampling errors have been estimated for both the HIS and the NMCES surveys. They are small relative to the difference in these estimates. For instance, the HIS estimate of 7.4 million people with chronic bronchitis has a relative standard error of 5 percent. For emphysema, the relative standard error is 9.5 percent.   The standard errors for the NMCES prevalence rates are somewhat larger because it samples fewer people.

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13. **The** deflation factor is 0.843, derived from the medical price index for 1977 (202.1) and 1979 (239.7). Source: U.S. Statistical Abstract, Department of Commerce, 1982-3.

The two-year difference in base years also is unlikely to have much of an effect on the difference in prevalence estimates. The proportion of the population with chronic bronchitis and with emphysema has been estimated by the HIS for many years at 3.5 and 1.0 percent per year, although emphysema prevalence in 1970 was only 0.7 percent, according to Freeman et al. (1976).

Therefore, the major difference in prevalence estimates is probably caused by the conditionality requirement in NMCES. If this is so, then the NMCES cost estimates would exclude many individuals with zero medical costs, individuals who would be included in the NHLBI estimates. T h i s implies that the NHLBI costs per case estimate should be lower than our costs per case but that the total costs should be similar.

Unfortunately, the total costs are not related in the expected way. The NHLBI estimate of cost per case of chronic bronchitis, the disease for which a higher proportion of sufferers are likely to have zero costs, is actually higher than our estimate. In addition, the NHLBI estimates of total costs are **much** different than ours. After adjusting the NHLBI estimates by a factor for population growth between 1977 and **1979,**[14] the NHLBI estimate for chronic bronchitis is $864.3 million versus our estimate of $205.6 million and for emphysema their estimate of total costs is $215.3 million versus ours of $640 million.

Annual Estimates from Freeman et al.

Another estimate of the annual medical costs of emphysema is available from Freeman, et al. (1976). Using data on health care utilization and average prices for 1970, they estimate costs to be $181.0 million, or $139.3 per case annually, allocated as shown in table 43. Converting to

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14. **Both** the HIS and the NMCES targeted the non-institutionalized civilian population. In 1977, it **was** 212.1 million; in 1979, it was 215.7 million. assuming prevalence rates were unchanged over this two year period, the total costs for 1979 are multiplied by 0.983 **(212.1/215.7)** to make them comparable to the NMCES costs.

1977 dollars, [15] total costs are \$303.5 million, or in terms of 1970 prevalence of emphysema, \$233.5 per case annually. These estimates are far lower than those of the NHLBI, and still lower than ours.

Lifecycle Cost Estimates from Oster et al. (1984)

Oster et al. estimate lifecycle costs of emphysema using (1) Diener and Burrows emphysema survival data, (2) an "engineering" approach to developing per person cost estimates, and (3) a cost algorithm nearly identical to that used in this study (based on Hartunian, Smart, and Thompson (1981)). Their estimates are not differentiated by age and sex and no attempt is made to incorporate population mortality statistics into the estimation procedure. They estimate that the lifecycle cost for all ages and both sexes combined, discounted at three percent, is \$5,689, in 1980 dollars (Table 5-6, p. 71.).

For comparability, we estimated lifecycle costs using a three percent discount rate and inflated our estimates to 1980 dollars using a factor of 1.315. [16]   Our estimate is \$4,910 per person for white males.

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15. The inflation factor is 1.676, derived from the medical price index for 1977 (202.1) and 1970 (120.6). Source: U.S. Statistical Abstract, Department of Commerce, 1982-3.

16. The medical price index (U.S. Statistical Abstract, Department of Commerce, 1982-3) is 202.1 for 1977 and 265.9 for 1980.

Table 1. Sample size by condition.

Disease	ICDA codes	Persons
Total		4789
Hypertension	401-404	3479
Ischemic heart disease	410-414	378
Non-specific heart disease	429	884
Chronic bronchitis	490-491	430
Emphysema	492	222

Table 2.   Sample size, by condition combinations

Disease	Persons with disease
Total	
Hypertension only	3006
Ischemic heart disease only	209
Non-specific heart disease only	518
Chronic bronchitis only	364
Emphysema only	129
Circulatory combination	417
Respiratory combination	5
Circulatory-respiratory combination	141

Table 3. Percent of sample with one 'simple' episode

Disease	Persons with disease	Percent wi th just one 'simple' episode of disease
Hypertension	3479	71.2
Ischemic	378	51.6
Non-specific heart disease	884	56.7
Chronic bronchitis	430	63.3
Emphysema	222	58.6

Table 4. Distribution of single vs multiple episodes types.

Disease	Total persons	One simple	One same-as	One* related-to/ stand-alone	Percent with only one single episode
		Number of single episodes to analyze			
Hypertension	3479	2476	227	462	91.0
Ischemic	378	195	34	80	81.7
Non-specific heart	884	501	104	166	87.2
Chronic bronchitis	430	272	49	63	89.3
Emphysema	222	130	21	42	86.9

*A single ' related to' implies that there is one and only one associated 'stand alone' to analyze, too.

Table 5.   Number of episodes by disease.

Disease	Number of episodes to analyze		
	Total episodes	Single* episodes	Multiple episodes
Total	7497	5 6 3 5	1862
Hypertension	4634	3627	1007
Ischemic	635	389	246
Non-specific heart	1334	937	397
Chronic bronchitis	566	447	119
Emphysema	328	235	93

*Includes both the single 'related to' episodes and the single 'stand alone' episodes associated with them.

Table 6. Number of observations, by condition and episode type.

Disease	One simple	One same-as	One* related- to/ stand-alone	Multiple
Hypertension	2476	227	462	314
Ischemic	195	34	80	69
Non-specific heart	501	104	166	113
Chronic bronchitis	272	49	63	46
Emphysema	130	21	42	29

*A single 'related to' implies that there is one and only one associated 'stand alone' to analyze, too.

Table 7. Persons and households in U.S., with episodes of illness, chronic episodes, and chronic episodes of target diseases* (NMCES, 1977)

	Unweighted		Weighted (millions)	
	Persons	Households	Persons	Households
Total	40,320	14,538	212.1	78.0
With episode of illness	32,064	13,669	172.1	73.5
With chronic episode	22,147	12,097	118.6	65.0
With target diseases	4,789	4,065	24.4	20.9

*An episode of illness means that the survey respondent had some medical event (purchase, visit, stay) or limitation status or disability day caused by a disease. Illnesses which did not cause such events, status, or a disability day are not indicated as having an episode of illness.

Table 8.   Expenses Per Person by Condition and **Episode** Type.   **&weighted.   Single** Episodes.

CONDITION	EPISODE TYPE	N	Mean Expense	Std Dev	Maximum	Conditional Mean
Bronchitis	simple	272	$79.73	$597.16	$9712.00	$96.81
	same as	49	109.24	333.08	2286.27	118.96
	related to	63	144.02	263.15	1530.17	151.22
	stand alone	63	66.32	110.93	1159.54	81.20
Emphysema	simple	130	278.90	801.53	5552.00	381.66
	same as	21	1002.64	2928.95	13535.02	1108.18
	related to	42	890.06	1854.88	9632.04	958.53
	stand alone	42	515.41	1027.16	4654.75	656.05
Hypertension	simple	2476	102.06	336.65	9144.00	109.25
	same as	227	542.92	1585.96	12093.03	560.20
	related to	462	520.22	1662.45	22251.75	544.72
	stand alone	462	220.51	808.98	10477.39	233.19
Ischemic HD	simple	195	620.14	2363.61	22013.69	716.24
	same as	34	2253.06	4099.21	14697.77	2253.06
	related to	80	1235.89	3281.48	23843.88	1251.53
	stand alone	80	959.27	3153.49	23040.63	1023.22
Nonspecific HD	simple	501	594.49	2118.40	27020.25	722.91
	same as	104	1359.03	3565.19	23883.04	1413.39
	related to	166	999.45	1918.76	15444.70	1005.50
	stand alone	166	638.61	1657.20	15360.66	693.09

Table 9.   Expenses per Person by Condition and Episode Type, Males. Unweighted. Single Episodes.

CONDITION	EPISODE TYPE	N	Mean Expense	Std Dev	Maximum	Conditional Moan
Bronchitis	simple	119	$117.25	$889.08	$9112.00	$149.34
	same as	24	86. 47	133. 78	654. 60	94.33
	related to	22	113.39	167. 55	643. 75	116.79
	stand alone	22	68. 73	155. 51	626. 45	79.50
Emphysema	simple	95	308. 62	812. 10	5552. 00	424.91
	same as	13	1339.14	3689.70	13535. 82	1450.74
	related to	32	712.25	1304. 46	5059. 79	735. 23
	stand alone	32	600. 58	1136. 64	4854. 75	739.18
Hypertension	simple	954	96. 46	312. 74	9144.00	104.93
	same as	85	792.10	2092. 40	11747.78	042. 25
	related to	160	860. 61	2519.88	22251.75	905. 90
	stand alone	160	215.57	957.17	8937. a2	295. 92
Ischemic HD	simple	118	807. 33	2939.54	22013. 69	943. 22
	same as	27	2317. 62	4169.98	14697.77	'2317. 62
	related to'	39	1522. 71	4119.68	23843.88	1562.78
	stand alone	39	1099. 24	3930.29	23840. 63	1190.65
Nonspecific HD	simple	244	572. 74	2134.86	25975.58	724.08
	same as	53	1623. 02	3935.92	23883.04	1155. 51
	related to	87	1114.24	2326.59	15444. 10	1127. 20
	stand alone	87	710.42	2021.01	15360.86	792. 39

Table 10. **Expenses per Person** by Condition and **Episode** Type, **Females.** **Unweighted.** **Single Episodes.**

CONDITION	EPISODE TYPE	N	Mean Expense	Std Dev	Maximum	Conditional Mean
Bronchitis	simple	153	$50.54	$142.02	$1416.00	$60.41
	same as	25	131.11	451.34	2288.27	142.51
	related to	41	160.46	303.79	1530.17	168.60
	stand alono	41	68.09	1110.52	1159.54	82.11
Emphysema	simple	35	198.24	777.05	4619.66	266.86
	same as	a	455.63	787.81	2288.27	520.95
	related to	10	1459.06	3056.22	9632.04	1823.82
	stand alono	10	243.12	496.30	1612.19	347.31
Hypertension	simple	1522	105.51	315.49	6056.00	111.69
	same as	142	393.40	1167.56	12093.03	399.02
	related to	302	352.12	888.13	10532.14	359.25
	stand alono	302	191.43	718.26	10471.39	200.74
Ischemic HD	simple	77	334.80	906.28	5676.00	379.11
	same as	7	2004.06	4120.32	11165.32	2004.06
	related to	41	963.06	2233.24	10527.75	963.06
	stand alono	41	826.13	2219.98	10513.00	868.50
Nonspecific HD	simple	251	615.14	2222.92	27020.25	721.88
	same as	51	1084.68	3149.93	17396.44	1084.68
	related to	79	873.02	1337.52	5496.06	813.02
	stand alone	79	559.96.	1125.76	5470.00	589.82

Table 1 1Expenses by Condition and Age for Simple, Single Episodes, Halos. Unweighted.

CONDITION	Age Group	N	Mean Expense	Std Dev	Maximum	Conditional Mean
Bronchitis	o-9	39	$37.87	$1)5.36	$478.78	$43.44
	10-19	20	36.90	67.82	270.00	56.77
	20-29	10	29.61	25.57	75.00	37.09
	30-39	11	la.48	28.95	76.55	40.65
	40-49	5	48.87	54.99	134.76	61.08
	50-59	6	35.70	28.91	79.66	35.10
	60-69	15	39.65	40.73	139.00	42.46
	70-79	10	1000.64	3060.95	9712.00	1111.82
	.80-89	3	59.48	52.59	116.00	59.40
Emphysenn	40-49	5	351.39	638.66	1476.20	585.64
	50-59	19	506.44	1317.66	5552.00	601.40
	60-69	49	212.53	475.75	1905.00	325.44
	70-79	18	195.40	495.62	1763.00	251.22
	80-89	3	1335.47	2165.23	3834.60	1335.47
	90-99	1	2.19		2.19	2.19
Hypertension	o-9	4	46.80	62.54	132.14	93.61
	10-19	7	62.89	100.00	281.86	88.05
	20-29	42	0.93	285.17	1852.00	120.30
	30-39	71	60.86	79.28	439.17	72.02
	40-49	129	85.65	163.99	1182.90	96.91
	50-59	220	17.51	155.58	1955.51	83.36
	60-69	252	104.81	343.42	9147.77	110.51
	10-79	173	136.84	717.51	9144.00	140.08
	80-89	44	98.19	148.30	795.57	103.49
	90-99	4	78.57	70.12	140.70	78.57
Ischemic HD	10-19	1	0.00	.	0.00	
	30-39	2	125.21	162.08	239.82	125.2;
	40-49	13	1141.45	3361.65	12269.28	1648.76
	50-59	33	585.01	1314.46	6313.10	715.01
	60-69	39	1315.16	4552.01	22873.69	1449.49
	70-79	20	268.92	470.93	1804.00	316.38
	80-89	10	186.08	415.85	1358.20	206.76
Nonspecific HD	O-9	1	0.00		0.00	
	10-19	5	439.22	671.76	2009.00	439.22
	20-29	7	119.40	1812.89	4966.51	1678.60
	30-39	1	3.00		3.00	3.00
	40-49	22	425.81	1028.3;	4353.98	851.75
	50-59	55	326.42	940.83	5570.19	437.88
	60-69	72	727.17	3131.91	25975.58	872.60
	70-79	53	848.62	2273.02	10050.22	999.72
	80-89	24	323.16	1187.53	5889.00	337.21
	90-99	4	22.06	9.05	30.60	22.86

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Table 12. **Expenses** by Condition **and** Ago **for Simple**, Single Episodes. **Females. Unweighted.**

CONDITION	Age Group	N	Mean Expense	Std Dev	Maximum	Conditional Mean
Bronchitis	o-9	29	$30.44	$47.56	$248.00	$33.95
	10-19	13	23.46	28.45	106.28	27.12
	20-29	26	25.33	28.33	100.99	31.36
	30-39	20	26.84	29.43	132.11	31.58
	40-49	16	40.32	79.49	323.36	53.76
	50-59	la	55.24	98.98	394.00	71.02
	60-69	16	55.03	68.88	250.14	58.70
	70-79	14	100.96	227.42	072.11	128.50
	ao-a9	1	1416.00		1416.00	1416.00
Emphysema	10-19	1	150.70		150.70	150.10
	30-39	1	0.00		0.00	
	40-49	1	0.00	.	0.00	
	50-59	8	120.31	185.62	521.35	137.5;)
	60-69	12	459.74	1314.25	4619.66	501.54
	70-79	10	30.55	49.35	149.51	50.92
	80-89	2	1.38	1.94	2.75	2.15
Hypertension	O-9	1	3.00		3.00	3.00
	10-19	8	7.41	8.16	19.59	ii.85
	20-29	28	98.35	239.69	1168.00	114.15
	30-39	78	135.35	682.90	6056.00	157.57
	40-49	199	109.16	412.47	5215.00	118.06
	50-59	348	124.28	372.17	4143.52	131.06
	60-69	409	88.66	179.92	2263.33	92.04
	70-79	324	100.34	195.08	2298.00	105.21
	80-89	110	102.18	201.42	1731.90	105.66
	90-99	16	126.10	323.66	1326.96	155.20
	100+	1	114.00		114.00	114.00
Ischemic HD	30-39	1	0.00		0.00	
	40-49	6	1175.56	2227.1;	5676.00	1175.56
	50-59	15	153.26	308.01	1216.09	116.84
	60-69	21	357.11	818.43	3500.14	416.62
	70-79	22	238.51	795.01	3181.39	262.36
	80-89	11	323.46	671.93	2234.27	355.81
	90-99	1	122.37		122.37	122.37
Nonspecific HD	O-9	1	49.90		49.90	49.90
	10-19	3	2.00	2.6;	5.00	3.00
	20-29	5	2.40	5.37	12.00	12.00
	30-39	10	474.92	692.44	1831.00	949.84
	'40-49	13	349.41	747.42	2590.05	454.23
	50-59	37	615.26	1663.63	8308.67	711.40
	60-69	63	767.69	3108.12	21020.25	930.09
	70-79	71	533.15	1407.79	6917.02	573.54
	ao-89	43	349.32	910.82	4577.00	385.15
	90-99	10	2113.70	3118.33	8303.99	2113.70
	100+	1	3592.00		3592.00	3592.00

Table 13. Aggregated' Expenses per Person by Condition.   Unweighted.   Single Episodes.

	N	Bean Expense	Std Dev	Maximum	Conditional Mean
CONDITION					
Bronchi t is	384	$81.62	$520.65	$9712.00	$97.34
Emphysema	193	409.13	1266.12	13535.82	5 3 7 . 1 6
Hypertension	3165	150.98	615.08	12093.03	1 6 0 . 8 9
Ischemic HD	309	887.99	2849.94	23840.63	987.01
Nonspecific HD	771	707.16	2331.71	27020.25	819.88

[a] Aggregated over episode types (see text).

Table 14. Frequency Distribution of Aggregated Expenses per Person, by Condition.
Unweighted.   Single Episodes.

Percentage of Sample in Each Expense Category

Total Expense	Bronchitis	Emphysema	Hypertension	Ischemic HD	Nonspecific HD
$ 0	16.1	23.8	6.2	10.0	13.7
O-25	39.3	23.3	23.4	17.8	21.0
25-50	21.6	8.3	20.2	11.7	12.3
50-75	8.1	6.2	14.1	6.1	7.5
75-100	3.9	4.7	8.8	6.5	5.1
100-150	4.9	7.3	11.1	10.0	7.0
150-200	1.3	4.1	5.4	6.8	4.3
200-300	1.8	4.1	4.4	9.4	7.8
300-400	0.5	1.6	2.0	1.9	2.5
400-500	0.5	1.0	0.9	2.6	1.6
500-750	0.5	2.6	0.9	1.3	1.9
750-1000	0.3	1.0	0.5	1.3	1.3
1000-1500	0.5	3.1	0.7	3.2	2.7
1500-2000	0.3	4.1	0.4	2.3	2.1
2000-3000	.	1.6	0.4	1.3	2.2
3000-4000	.	1.0	0.2	2.6	2.5
4000-5000	.			0.3	1.0
5000-10000	0.3	0.5 1.0	0.1 0.4	1.9	2.3
10000-20000	.	0.5	0.1	2.3	0.8
20000+	.	.	.	0.6	0.4
N	384	193	3165	309	771
Bean Expense	$82	$409	$151	$888	$707
Median Expense	$22	$34	$51	$87	$62

Table 15.   Average Expenses Per Person By Expense and Condition. Unweighted. Single Episodes.

CONDITION	Expense	Mean Expense	Std Dev	Maximum
Bronchitis (N=384)	Medical Contact	$32.21	$105.13	$1683.00
	Hospital	36.42	501.42	9635.00
	Drugs	11.34'	33.32	605.27
	Total Expenses	81.62	520.65	9712.00
Emphysema (N=193)	Medical Contact	58.15	164.66	1683.00
	Hospital	312.10	1228.30	13313.00
	Drugs	34.20	69.99	605.27
	Total Expenses	409.13	1266.12	13535.82
Hypertension (N=3165)	Medical Contact	42.77	91.16	1341.79
	Hospital	68.48	586.49	11636.00
	Drugs	37.67	45.46	439.17
	Total Expenses	150.98	615.08	12093.03
Ischemic HD (N=309)	Medical Contact	63.35	117.13	891.62
	Hospital	756.85	2784.52	23503.00
	Drugs	57.43	85.36	674.25
	Total Expenses	887.99	2849.94	23840.63
Nonspecific HD (N=771)	Medical Contact	64.15	137.75	1753.50
	Hospital	602.53	2279.71	26837.00
	Drugs	36.35	56.55	386.50
	Total Expenses	707.16	2331.71	27020.25

Table 16.   Funding Source by Condition. Unweighted. Single Episodes.

CONDITION	N	Mean Expense'	Family	Medicaid	Medicare	Personal Insurance	Other
Bronchitis	384	$81.62	$22.14 (27%)[b] [70%][c]	$14.29 (18%) [8%]	$26.58 (33%) [3%]	$14.61 (18%) [15%]	$4.00 (0.1%) [4%]
Emphysema	193	409.13	78.79 (19%) [56%]	31.46 (8%) [8%]	116.07 (28%) [11%]	116.47 (29%) [15%]	66.34 (16%) [10%]
Hypertension	3165	150.98	55.09 (37%) [70%]	22.15 (15%) [8%]	23.33 (16%) [5%]	27.94 (19%) [12%]	22.47 (15%) [6%]
Ischemic HD	309	887.99	145.82 (16%) [53%]	5.86 (0%) [3%]	205.33 (23%) [11%]	408.99 (46%) [25%]	121.99 (14%) [9%]
Nonspecific HD	771	707.16	90.47 (13%) [53%]	106.46 (15%) [13%]	252.26 (36%) [14%]	133.41 (18%) [11%]	124.56 (36%) [9%]

"Mean does not include observations reporting zero.

[b]Percentage of Mean Expense.

[c]Percentage of Expense, Averaged Over All Individuals.

Table 17. Aggregated Expenses Per Person by Condition. Weighted. Single Episodes.

CONDITION	N (1000's)	Bean Expense	Std Dev[a]	Maximum	Total Expense (millions $)
Bronchitis	1963	$67.80	$356.56	$9712.00	so. 13
Emphysema	831	441.84	1307.55	13535.82	0.37
Hypertension	14544	139.09	566.03	12093.03	2.02
Ischemic HD	1560	1010.03	3202.42	23840.63	1.56
Nonspecific HD	3277	755.44	2420.63	27020.25	2.48

"Standard Deviations have not been corrected for veighting.
Corrected standard deviations would be somewhat larger.

Table 18.Medical Contacts per Person by Condition. Weighted. Single Episodes.

CONDITION	Expense	Moan	Std Dev	Maximum	Conditional[a] Moan
Bronchitis	Total Medical Contacts	1.77	3.72	50.00	
	Hospital Events	0.02	0.14	2.00	.
	Hospital Nights	0.15	2.04	52.00	9.00
	Nurring Homo Nights	0.00	0.00	0.00	
	Doctor Visits	1.38	2.00	22.00	2.07
	Prescriptions	2.40	9.05	153.00	
Emphysema	Total Medical Contacts	2.53	4.76	25.00	
	Hospital Events	0.18	0.40	3.00	
	Hospital Nights	1.43	4.50	27.00	10.25
	Nursing Home Nights	0.03	0.49	9.00	9.00
	Doctor Visits	2.30	4.46	22.00	5.33
	Proscriptions	6.31	15.75	153.00	
Hypertension	Total Medical Contacts	2.24	3.34	35.00	
	Hospital Events	0.03	0.19	3.00	
	Hospital Nights	0.31	4.64	261.00	12.24
	Nursing Home Nights	0.01	0.36	16.00	13.51
	Doctor Visits	1.95	2.85	30.00	3.28
	Prescriptions	5.62	6.36	61.00	

Table 18. Continued.

CONDITION	Expense	Mean	Std Dev	Maximum	Conditional[a] Mean
Ischemic HD	Total Medical Contacts	2.60	4.34	49.00	
	Hospital Events	0.23	0.64	6.00	
	Hospital Nights	2.14	6.49	55.00	12.94
	Nursing Home Nights	0.03	0.59	14.00	7.47
	Doctor Visits	2.21	3.22	25.00	3.59
	Proscriptions	a.43	10.90	65.00	
Nonspecific HD	Total Medical Contacts	2.60	4.60	44.00	
	Hospital Events	0.25	0.76	11.00	
	Hospital Nights	2.76	11.57	261.00	16.28
	Nursing Home Nights	0.00	0.12	4.00	4.00
	Doctor Visits	2.14	3.35	28.00	3.92
	Prescriptions	6.02	8.23	45.00	

'Conditional Means were not calculated for all types of Medical Contacts.

Table 19. **Measures** of Distress by Condition.   Weighted.   Single **Episodes.**

CONDITION		**Mean**	**Std Dev**	Maximum
Bronchitis	Disability Day5	7.286	16.371	1 6 5
	Bed Days [a]	3.598	10.177	108
	Work Lost Days [a]	0.825	3.018	32
	Cut-Down Days [a]	2.642	10.404	93
	Hswork Lost Days [a]	1.076	5.878	108
Emphysemn	Disability Days	35.041	66.108	339
	Bed Day5	7.543	23.593	209
	Wotk Loat Day5	2.789	12.139	99
	Cut-Down Days	11.654	39.933	282
	Hswork Lost Days	16.855	50.335	339
Hypertension	Diaability Day5	4.781	21.178	282
	Bed Days	1.652	11.632	265
	Wotk Lost Day5	0.814	7.670	206
	Cut-Down Days	1.416	9.773	197
	Hswork Lost Days	1.785	12.187	244
Ischemic HD	Disability Days	22.550	47.592	327
	Bed Days	5.785	17.205	171
	Work Lost Day5	3.857	16.313	168
	Cut-Down Day5	7.164	24.411	203
	Hswotk Lost Days	9.013	33.356	320
Nonspecific HD	Disability Day5	26.946	58.322	365
	Bed Day5	10.466	35.288	321
	Work Lost Days	3.686	18.520	242
	Cut-Down Day5	6.184	25.814	318
	Hswork Lost Day5	11.693	37.228	335

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[a] These **measures may** overlap.

Table 20.   Aggregated Expenses per Person by Condition, by Sex. Unweighted. Multiple Episodes.

	N	Mean Expense	Std Dev	Maximum	Conditional Mean
CONDITION					
All					
Bronchitis	46	$222.98	$655.14	$4251.16	$310.83
Emphysema	29	2121.03	4855.86	19563.78	2121.03
Hypertension	314	869.06	4096.73	60588.00	988.71
Ischemic HD	69	2912.53	6419.35	36462.00	3044.92
Nonspecific HD	113	3320.77	8166.24	49743.00	3573.78
Hales					
Bronchitis	25	350.93	872.55	4251.16	438.67
Emphysema	20	2122.10	5659.65	19563.78	2122.10
Hypertension	95	1543.96	6862.33	60588.00	1833.45
Ischemic HD	39	3021.39	5589.50	23413.50	3100.90
Nonspecific HD	55	4742.21	10353.60	49743.00	5114.14
Females					
Bronchitis	21	70.66	85.28	252.50	114.15
Emphysema	9	2118.65	2540.20	6029.83	2118.65
Hypertension	219	576.30	1872.66	22275.89	643.92
Ischemic HD	30	2771.01	7459.93	36462.00	2968.94
Nonspecific HD	58	1972.86	5067.71	33367.75	2119.00

Table 21. Frequency Distribution of Aggregated Expenses per Person by Condition.
Unweighted.   Multiple Episodes.

Percentage of Sample In Each Expense Category

Total Expense	Bronchitis	Emphysema	Hypertension	Ischemic HD	Nonspecific HD
s 0	28.3	.	12.1	4.3	7.1
O-25	10.9	20.7	6.4	7.2	7.1
25-50	4.3	3.4	8.6	4.3	6.2
50-75	10.9	.	4.1	2.9	1.8
75-100	10.9	3.4	8.0	5.8	5.3
100-150	6.5	17.2	11.8	7.2	7.1
150-200	4.3	3.4	6.7	7.2	7.1
200-300	13.0	13.8	11.8	8.7	6.2
300-400	2.2	3.4	6.4	5.8	8.0
400-500	.		4.8	1.4	1.8
500-750	4.3	3.4	5.4	7.2	6.2
750-1000	.	3.4	1.6	8.7	2.7
1000-1500	.	6.9	5.1	1.4	1.8
1500-2000	2.2	3.4	0.6	2.9.	0.9
2000-3000	.		1.9	1.4	5.3
3000-4000	.		1.0	4.3	7.1
4000-5000	2.2	3.4	1.0	.	3.5
5000-10000	.	6.9	1.3	10.1	7.1
10000-20000	.	6.9	0.6	4.3	3.5
20000+	.		1.0	4.3	4.4
N	46	29	314	69	113
Mean	$223	$2121	$869	$2913	$3321
Median	$69	$200	$146	$328	$318

Table 22.   Average Expenses Per Person By Expense and Condition.
Unweighted. Multiple Episodes.

CONDITION	Expense	Mean Expense	Percent of **Total Expense** **Multiple Episode**	**Percent of** **Total Expense** **Single Episode**
Bronchitis (N[a]=44)	Medical Contact	$94.35	41.5%	39.5%
	Hospital	85.75	37.7	44.6
	Drugs	43.78	19.2	13.9
	Total Expense	227.61	98.4	98.0
Emphysema (N[a]=26)	Medical Contact	156.11	8.2	14.2
	Hospital	1633.62	85.3	76.3
	Drugs	118.43	6.2	8.4
	Total Expense	1914.47	99.7	98.9
Hypertension (N[a]=267)	Medical Contact	144.30	18.4	28.3
	Hospital	555.82	70.9	45.4
	Drugs	80.83	10.3	25.0
	Total Expense	784.03	99.6	98.7
Ischemic HD (N[a]=60)	Medical Contact	261.78	9.1	7.1
	Hospital	2474.12	86.4	85.2
	Drugs	122.06	4.3	6.5
	Total Expense	2864.51	99.8	98.8
Nonspecific HD (N[a]=94)	Medical Contact	216.47	7.1	9.1
	Hospital	2702.34	89.1	85.2
	Drugs	103.70	3.4	5.1
	Total Expense	3031.84	99.6	99.4

[a] **Complex** Multiple Episodes excluded (see text).

Table 23.   Funding Source by Condition. Unweighted. Multiple Episodes.

CONDITION	N[a]		Mean Expense[b]	Family	Medicaid	Medicare	Personal Insurance	dther
Bronchitis	4	4	$227.61	$117.29 (52%)[c] [59%][d]	$5.28 (2%) [4%]	$13.35 (6%) [4%]	$68.52 (30%) [18%]	$23.15 (10%) [12%]
Emphysema	26		1914.47	153.01 (8%) [42%]	644.87 (34%) [13%]	262.16 (14%) [7%]	68.29 (4%) [10%]	785.15 (41%) [11%]
Hypertension	267		784.03	154.03 (20%) [55%]	69.07 (9%) [15%]	350.15 (45%) [9%]	132.81 (16%) [12%]	77.96 (10%) [10%]
Ischemic HD	60		2864.51	193.78 (7%) [47%]	451.08 (16%) [12%]	708.28 (25%) [16%]	1157.89 (40%) [19%]	353.47 (12%) [7%]
Nonspecific HD	94		3031.84	348.98 (12%) [37%]	193.56 (6%) [13%]	1391.71 (46%) [19%]	581.83 (19%) [15%]	515.74 (17%) [14%]

[a] Complex Hultiple Episodes excluded (see text).

[b] Mean does not included observation reporting zero.

[c] Percentage of Bean Expense.

[d] Percentage of Expense, Averaged Over All Individuals.

Table 24.   Aggregated Expenses Per Person by Condition. Unweighted. Multiple Episodes.

CONDITION	N (1000's)	Mean Expense	Std Dev	Maximum	Total Expense (millions $)
Bronchi t is	270	$205.04	$545.97	$4251.16	$55.4
Emphysema	142	1713.72	3969.31	19563.78	243.4
Hypertension	1518	978.74	4675.46	60588.00	1485.8
IschemicHD	352	3602.65	7148.95	36462.00	1267.9
Nonspecific HD	579	3942.17	9557.65	49743.00	2282.6

Table 25.   Aggregated Expenses Per Person and Total Expenses by Condition. **Unweighted** and Weighted.

	N	**Mean** Expense	Std Dev	Maximum	Total Expense (millions $)
CONDITION					
Unweighted.					
Bronchitis	430	$96.74	$537.54	$9712.00	
Emphysema	222	632.76	2171.28	19563.78	
Hypertension	3479	215.79	1377.29	60588.00	
Ischemic HD	378	1257.55	3831.66	36462 .OO	
Nonspecific **HD**	884	1041.26	3736.60	49743.00	
Veighted.					
Bronchitis	2418603	85.02	411.26"	9712.00	205.6
Emphysema	1065787	600.00	1917.32'	19563.78	640.2
Hypertension	17563452	212.55	1495.81'	60588.00	3733.1
Ischemic AD	2050892	1450.02	**4252.55[a]**	36462.00	2973.8
Nonspecific HD	422 7040	1184.25	4320.43'	49743.00	5005.9

"Standard Deviations have not been corrected for weighting. Corrected standard deviations would be somewhat higher.

Table 26. Average Total Expenses and Expenses per Person for Males, by Age. Weighted.

CONDITION	Age Group	N	Mean Expense	Std Dev	Maximum	Total Expense (millions $)
Bronchitis	o-9	438016	$59.59	$109.84	$626.45	$26.1
	10-19	160828	33.55	51.83	270.00	5.4
	20-29	89507	84.99	148.34	514.00	7.6
	30-39	60767	46.86	63.46	197.56	2.8
	40-49	65470	96.40	140.54	446.05	6.3
	so-59	67189	141.66	186.04	654.60	9.5
	60-69	125470	249.56	781.04	4251.16	31.3
	70-79	58254	485.20	2061.74	9712.00	28.3
	80-89	11790	60.22	51.86	116.00	0.7
	> 20	478447	180.94	841.34	9712.00	86.6
	Average	1077291	109.60	569.05	9712.00	118.1
Emphysema	40-49	50017	562.54	612.46	1647.00	28.1
	SO-59	164485	884.41	2481.30	13535.82	145.5
	60-69	341324	371.82	1639.63	17615.01	126.9
	70-79	168861	580.66	2667.20	19563.78	98.1
	80-89	39177	1474.26	1585.82	4854.75	57.8
	90-99	2872	2.19	0.00	2.19	0.01
	> 20	766736	595.16	2079.27	19563.78	456.3
	Average	766736	595.16	2097.27	19563.78	456.3
Hypertension	0 - 9	17632	37.16	51.85	132.14	0.7
	10-19	42691	241.54	436.87	1186.45	10.3
	20-29	266550	74.09	199.29	1852.00	19.7
	30-39	963863	96.74	369.69	6427.20	54.6
	40-49	1000099	183.71	627.80	5504.85	183.7
	so-59	1720562	264.21	1502.78	22771.07	454.4
	60-69	1763206	486.97	3950.75	60588.00	858.6
	70-79	1025353	115.82	428.34	9144.00	118.8
	80-89	343210	176.83	358.22	2391.58	60.7
	90-99	21317	80.95	63.68	140.10	1.7
	100+	5215	37.80	0.00	37.80	0.2
	> 20	6709375	261.22	'2192.97	60588.00	1752.6
	Average	6769698	260.15	2183.48	60588.00	1763.6
Ischemic HD	10-19	4014	0.00	0.00	0.00	0.0
	30-39	21589	102.33	99.31	239.82	2.2
	40-49	138574	4691.54	8048.54	23840.63	650.1
	50-59	416557	1346.61	2772.72	14697.17	560.9
	60-69	381771	1556.08	4631.68	23413.50	594.1
	70-79	187042	769.57	2370.64	12571.90	143.9
	80-89	74932	1174.44	3013.67	11320.83	88.0
	> 20	1220465	1670.91	4400.88	23840.63	2039.3
	Average	1224479	1665.43	4394.70	23840.63	2039.3
Nonspecific HD	O-9	4451	0.00	0.00	0 . 0 0	0.0
	10-19	18671	402.77	763.10	2009 .oo	7.5
	20-29	41827	974.21	1958.24	4966.51	40.7
	30-39	20514	1063.75	1614.51	3543.00	21.9
	40-49	204956	2032.02	4906.42	23883.04	416.5
	50-59	524168	1375.39	5077.84	38375.75	720.9
	60-69	595206	1274.62	4634.08	43326.75	758.7
	70-79	426144	2224.18	7825.51	49743.00	948.1
	SO-89	202381	589.05	2070.29	15360.86	119.2
	90-99	37315	276.94	450.81	1194.00	10.3
	100+	5215	13.30	0.00	73.30	0.3
	> 20	2057786	1415.72	5353.93	49743.00	3036.7
	Average	2080908	1462.93	5325.98	49743.00	3044.2

Table 27.   Average Total Expenses and Expenses per Person for Females, by Age. Weighted.

CONDITION	Age Group	N	Mean Expense	Std Dev	Maximum	Total Expense (millions $)
Bronchitis	o-9	259323	$24.86	$25.34	$248.00	$6.4
	10-19	124073	30.75	29.94	106.28	3.8
	20-29	'183679	25.02	28.99	100.99	4.6
	30-39	184770	34.31	31.29	140.50	6.3
	40-49	169845	144.12	454.43	2288.27	24.5
	SO-59	161668	44.85	67.75	394.00	7.3
	60-69	131213	57.09	62.49	250.14	7.5
	70-79	104508	138.05	229.63	872.11	14.4
	80-89	22233	571.57	605.95	1416.00	12.7
	≥ 20	957916	80.69	246.00	2288.27	77.3
	Average	1341312	65.27	209.81	2288.27	87.6
Emphysema	10-19	6527	150.70	0.00	150.70	1.0
	30-39	9555	1.63	2.34	5.00	0.01
	40-49	20710	831.19	1056.40	2288.27	17.2
	50-59	71957	164.58	314.57	1330.84	11.8
	60-69	82491	831.66	1812.83	6029.83	68.6
	70-79	92925	915.55	1683.53	5814.56	85.1
	80-89	14886	9.86	19.13	49.83	0.2
	≥ 20	292524	625.25	1434.02	6029.83	182.9
	Average	299051	614.89	1419.98	6029.83	183.9
Hypertension	o-9	4076	3.00	0.00	3.00	0.1
	10-19	72505	263.52	482.71	1292.00	19.1
	20-29	180142	150.50	400.29	1989.33	27.1
	30-39	603108	148.98	627.97	6056.00	89.9
	40-49	1416787	219.91	078.57	9712.50	311.6
	50-59	2410437	152.80	449.87	4476.60	368.3
	60-69	2883041	183.79	1040.94	22275.89	529.9
	70-79	2260757	216.98	916.51	12093.03	490.6
	80-89	851427	141.79	329.74	3389.75	120.7
	90-99	107918	111.65	231.96	1326.96	12.0
	100+	3556	114.00	0.00	114.00	0.4
	≥ 20	10717173	181.99	806.97	22275.89	1950.4
	Average	10793754	102.47	605.11	22275.89	1969.6
Ischemic HD	30-39	3099	0.00	0.00	0.00	0.0
	40-49	72233	886.58	1577.48	5676.00	64.0
	50-59	199114	2402.90	7326.95	36462.00	494.4
	60-69	202266	783.31	2083.52	11165.32	158.5
	70-79	242797	719.83	1978.96	10513.00	174.8
	80-89	85928	475.98	1098.38	5456.77	40.9
	90-99	20956	95.23	85.16	206.26	2.0
	≥ 20	826413	1130.84	4011.51	36462.00	934.5
	Average	826413	1130.84	4011.51	36462.00	934.5
Nonspecific HD	o-9	10707	1110.33	1541.67	3351.44	11.9
	10-19	24546	311.85	459.30	1071.50	7.7
	20-29	29518	33.36	53.16	145.00	1.0
	30-39	60595	668.76	783.48	2322.55	40.5
	40-49	114468	699.74	1197.50	3994.30	80.1
	50-59	251402	1071.81	2808.74	13936.69	269.5
	60-69	605551	1368.06	4845.80	33367.75	828.4
	70-79	534099	492.67	1273.84	6917.02	263.1
	80-89	407034	695.64	1785.61	13630.14	283.2
	90-99	100432	1477.24	2409.72	8303.99	148.4
	100+	7780	3592.00	0.00	3592.00	27.9
	≥ 20	2110879	920.04	3040.69	33367.75	1942.1
	Average	2146132	914.03	3018.70	33367.75	1961.6

Table 28.   Funding Source by Condition. Ueighted.

	N[a]	Bean Expense[b]	Family	Medicaid	Medicare	Personal Insurance	Other
CONDITION							
Bronchitis	2405343	$96.01	$36.26 (38%)" [70%]d	$14.93 (16%) [7%]	$17.34 (18%) [2%]	$19.73 (21%) [16%]	$7.75 (8%) [5%]
Emphysema	1050758	676.56	113.79 (17%) [53%]	102.91 (15%) [8%]	172.45 (26%) [12%]	144.63 (21%) [15%]	142.78 (21%) [10%]
Hypertension	17334630	208.29	66.58 (32%) [69%]	18.38 (9%) [7%]	53.82 (26%) [5%]	41.46 (20%) [13%]	28.05 (14%) [6%]
Ischemic HD	2003191	1516.18	178.95 (12%) [51%]	114.69 (8%) [4%]	292.99 (19%) [11%]	680.00 (45%) [25%]	249.55 (17%) [9%]
Nonspecific HD	4130483	1238.57	150.65 (12%) [52%]	108.80 (9%) [10%]	503.34' (41%) [15%]	284.15 (23%) [13%]	191.63 (16%) [10%]

'Complex Hultiple Episode'excluded (see text).

[b]Mean does not 'include observations reporting zero.

[c]Percentage of Mean Expense.

[d]Percentage of Expense by Source, Averaged Over All Individuals.

Table 29.   Funding Source by Condition for Hales 20 Years of Age or Greater. Weigh ted.

	N[a]	Mean Expense[b]	Family	tiedicaid	Medicare	Personal Insurance	Other
CONDITION							
Bronchitis	478447	$205.24	$69.01 (34%)[c] [65%][d]	$4.25 (2%) [1%]	$57.58 (28%) [4%]	$62.38 (30%) [25%]	$12.02 (6%) [4%]
Emphysema	766736	726.78	100.54 (14%) [51%]	96.62 (13%) [3%]	172.74 (24%) [12%]	165.93 (23%) [18%]	190.95 (26%) [13%]
Hypertension	6644806	268.87	60.96 (23%) [68%]	14.44 (5%) [3%]	94.03 (35%) [4%]	48.57 (18%) [16%]	50.87 (19%) [9%]
Ischemic HD	1184816	1739.77	180.77 (10%) [50%]	186.23 (11%) [4%]	287.79 (17%) [9%]	840.05 (48%) [28%]	244.93 (14%) [8%]
Nonspecific HD	2019627	1662.99	164.38 (10%) [51%]	72.77 (4%) [6%]	685.51 (41%) [12%]	493.92 (30%) [18%]	246.41 (15%) [13%]

'Complex Multiple Episode excluded (see text).

[b]Mean does not include observations reporting zero.

'Percentage of Bean Expense.

[d]Percentage of Expense by Source, Averaged Over All Individuals.

Table 30.   Aggregated Expenses Per Person by Condition, by Non-SMSA/SMSA.
Weighted.

CONDITION	N	Mean Expense	Std Dev
Non-SMSA			
Bronchitis	60977'4	$63.61	$139.03
Emphysema	362405	579.37	1902.51
Hypertension	5594985	161.36	973.24
Ischemic HD	462979	1643.57	4313.02
Nonspecific HD	1483588	1057.18	4037.70
SMSA			
Bronchitis	1808829	92.23	468.43
Emphysema	703382	611.69	1924.81
Hypertension	11968467	236.48	1684.87
Ischemic HD	1587913	1393.59	4233.09
Nonspecific HD	2743452	1252.96	4464.36

Table 31. Cumulative Survival Probabilities for Emphysema, by Age Group.

			Age of Onset				
	O-24	25-34	35-44	45-54	55-64	65-74	75 and up
Duration							
0	0.999	0.998	0.998	0.993	0.983	0.961	0.769
1	0.955	0.952	0.951	0.942	0.922	0.880	0.610
2	0.841	0.833	0.830	-0.819	0.792	0.736	0.434
3	0.734	0.721	0.718	0.704	0.671	0.606	0.342
4	0.666	0.650	0.646	0.629	0.591	0.518	0.243
5	0.613	0.595	0.589	0.571	0.528	0.447	0.222
6	0.568	0.548	0.542	0.521	0.474	0.387	0.159
7	0.521	0.499	0.492	0.469	0.419	0.329	0.141
8	0.427	0.400	0.393	0.372	0.326	0.245	0.098
9	0.377	0.349	0.342	0.320	0.275	0.197	0.081
10	0.330	0.300	0.292	0.271	0.228	0.155	0.056
11	0.292	0.260	0.252	0.231	0.189	0.122	0.054
12	0.258	0.225	0.217	0.197	0.157	0.096	0.038
13	0.194	0.159	0.152	0.136	0.106	0.061	0.026
14	0.158	0.121	0.115	0.102	0.077	0.042	0.019
15	0.129	0.091	0.086	0.075	0.054	0.028	0.014
16	0.104	0.066	0.062	0.053	0.037	0.018	0.009
17	0.084	0.045	0.042	0.035	0.024	0.011	0.007
18	0.070	0.031	0.028	0.023	0.015	0.006	0.004
19	0.058	0.019	0.017	0.014	0.009	0.003	0.003

Table 32. Age of Onset Distribution, by Condition, by Sex (Onset in 1977-78 Only). Weighted

Condition	Age of Onset													
	0-24		25-34		35-44		45-54		55-64		65-74		>74	
	%	N[a]	%	N	%	N	%	N	%	N	%	N	%	N
Chronic Bronchitis														
Male	67.5	110	2.9	9	4.9	12	7.5	14	7.8	18	7.8	19	1.6	8
Female	41.0	84	15.0	30	12.5	31	10.2	33	9.4	24	8.3	26	3.2	12
Emphysema														
Male					6.2	2	19.7	21	31.3	54	34.0	52	8.8	29
Female					10.0	4	20.2	8	25.3	16	28.9	17	15.7	13
Hypertension														
Male	5.5	33	9.6	66	15.7	135	26.0	241	24.4	337	14.2	317	4.5	147
Female	3.9	32	5.7	69	16.7	185	20.3	371	26.3	571	18.4	558	8.6	372
Ischemic HD														
Male					5.1	11	27.5	42	44.1	81	15.6	54	7.8	32
Female					7.5	3	27.7	21	16.5	43	22.8	46	25.5	41
Non-specific HD														
Male	0.1	11	2.3	6	5.3	15	26.2	69	16.3	105	23.0	119	26.1	99
Female	1.0	7	1.8	7	8.7	18	7.8	37	22.0	89	22.7	115	36.0	163

a. Actual Sample Size.   Percentages computed on basis of weighted sample.

Table 33. Average Expense Per Person by Condition, Age Group, ad Chset

Condition (Onset)	Age Group O-24	25-34	35-44	45-54	55-64	65-74	>74
Chronic Bronchitis							
1977-78	$39	$40	$71	$56	$49	$59	$1103
pm-1977	39	68	38	207	142	216	148
Emphysema							
1977-78			267	3017	786	204	2658
pre-1977			412	313	436	525	819
Hypertension							
1977-78	250	134	2 0 7	350	287	283	217
pre-1977	79	80	119	217	303	170	173
Ischemic HD							
1977-78			238	1720	6524	4459	1056
pre-1977	0	142	5342	1968	726	766	412
Non-Specific HD							
1977-78			1267	1410	3694	5636	1208
pm-1977			2948	1470	692	6%	585

Table 34. Average Expense Per Person by Condition, Age Group, and Onset
White Males Only

Condition (Onset)	0-24	25-34	35-44	45-54	55-64	65-74	>74
Chronic Bronchitis							
1977-78	$49	$19	$78	$84	$85	$31	$2971
pre–1977	59	133	33	230	332	348	32
Emphysema	.						
1977-78				4040	990	167	1628
pre–1977			1647	221	357	351	1054
Hypertension							
1977-78	193	56	87	372	498	374	99
pm-1977	62	58	100	282	455	162	148
Ischemic HD							
1977-78			0	3018	5421	7440	367
pre–1977	0	240	2899	1823	646	862	674
Non-Specific HD							
1977-78	2009	35	944	1618	1357	10799	607
pre–1977	41	2587	6079	1448	811	726	661

Age Group (header spanning all age columns)

Table 35. Regression Results for Chronic Bronchitis.

DESCRIPTIVE STATISTICS

VARIABLE	SUM	MEAN	UNCORRECTED SS	VARIANCE	STD DEVIATION
TCXP	41599.56999	96.74318602	127983854.3	288949.6023	537.5403262
ONSETFLG	210.00000	0.48837209	210.0	0.2504	0.5004470
AGE3	43.00000	0.10000000	43.0	0.0902	0.3003494
AGE4	47.00000	0.10930233	47.0	0.0976	0.3123816
AGE5	42.00000	0.09767442	42.0	0.0883	0.2972197
AGE6	45.00000	0.10465116	45.0	0.0939	0.3064600
RACEDP	473.00000	1.10000000	559.0	0.0902	0.3003494
SEXDP	670.00000	1.55813953	1150.0	0.2472	0.4971868
INTERCEP	430.00000	1.00000000	430.0	0.0000	0.0000000

DEP VARIABLE: TCXP   ESA00199 TC FOR ALL HEALTH CARE (XP)
ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	FVALUE	PROB>F
MODEL	7	982176.55862	140310.93695	0.481	0.8491
ERROR	422	122977202.82	291415.17255		
C TOTAL	429	123959379.38			

ROOT MSE	539.8288	R-SQUARE	0.0079	
DEP MEAN	96.74319	ADJ R-SQ	-0.0085	
C.V.	558.0019			

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR HO: PARAMETER=0	PROB > |T|	VARIABLE LABEL
INTERCEP	1	226.06965929	131.24916906	1.722	0.0857	INTERCEPT
ONSETFLG	1	12.02627179	52.98705595	0.227	0.8206	ESA00050 ONSET OF EPISODE FLAG
AGE3	1	-15.5649	89.99626445	-0.173	0.8628	
AGE4	1	53.51093014	86.74785274	0.617	0.5377	
AGE5	1	6.25213247	90.39353096	0.069	0.9449	
AGE6	1	79.06676313	87.81232705	0.900	0.3684	
RACEDP	1	-25.8247	88.11775679	-0.293	0.7696	WHITE/ALL OTHER
SEXDP	1	-76.9957	53.31445255	-1.444	0.1494	SEX

Table 36. Regression Results for Emphysema.

DESCRIPTIVE STATISTICS

VARIABLE	SUM	MEAN	UNCORRECTED SS	VARIANCE	STD DEVIATION
TCXP	140435.6900	647.1690783	1130779932	4814325.444	2194.157115
ONSETFLG	30.0000	0.1382488	30	0.120	0.345959
AGE3	6.0000	0.0276498	6	0.027	0.164346
AGE4	29.0000	0.1336406	29	0.116	0.341052
AGE5	70.0000	0.3225806	70	0.220	0.468545
AGE6	69.0000	0.3179724	69	0.218	0.466765
RACEDP	224.0000	1.0322581	238	0.031	0.177093
SEXDP	276.0000	1.2718894	394	0.199	0.445962
INTERCEP	217.0000	1.0000000	217	0.000	0.000000

DEP VARIABLE: TCXP   ESAO0199 TC FOR ALL HEALTH CARE (XP)

ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB>F
MODEL	7	29223977.94	4174853.99	0.863	0.5376
ERROR	209	1010670318	4835743.15		
C TOTAL	216	1039894296			

ROOT HSE	2199.032	R-SQUARE	0.0281	
DEP MEAN	647.1691	ADJ R-SQ	-0.0044	
C.V.	339.7926			

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR HO: PARAMETER=0	PROB >|T|	VARIABLE LABEL
INTERCEP	1	722.90040455	1004.54381	0.720	0.4726	INTERCEPT
ONSETFLG	1	731.11269125	438.73344710	1.666	0.0971	ESA000500NSET OF EPISODE FLAG
AGE3	1	-924.942	981.41073477	-0.942	0.3470	
AGE4	1	-383.62	532.65624575	-0.720	0.4722	
AGE5	1	-691.885	429.63679461	-1.610	0.1088	
AGE6	1	-611.98	429.95704832	-1.423	0.1561	
RACEDP	1	Ml.48654673	8588.09254115	0.584	0.5596	WHITE/ALL OTHER
SEXDP	1	-157.126	341.33356922	-0.460	0.6458	SEX

Table 37. Regression Results for Hypertension.

DESCRIPTIVE STATISTICS

VARIABLE	SUM	MEAN	UNCORRECTED SS	VARIANCE	STD DEVIATION
TCXP	748528.4498	217.9756697	6759138824	1921345.131	1386.125943
ONSETFLG	486.0000	0.1415259	486	0.122	0.348614
AGE3	320.0000	0.0931858	320	0.085	0.290735
AGE4	612.0000	0.1782178	612	0.146	0.382752
AGE5	908.0000	0.2644147	908	0.195	0.441085
AGE6	875.0000	0.2548049	875	0.190	0.435815
RACEDP	4068.0000	1.1846243	5336	0.151	0.388049
SEXDP	5592.0000	1.6284217	9908	0.234	0.483297
INTERCEP	3434.0000	1.0000000	3434	0.000	0.000000

DEP VARIABLE: TCXP , ESAO0199 TC FOR ALL HEALTH CARE (XP)
ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB>F
MODEL	7	19114586.33	2730655.19	1.422	0.1905
ERROR	3426	6576863247	1919691.55		
C TOTAL	3433	6595977834			

ROOT. HSE	1385.529	R-SQUARE	0.0029	
DEP MEAN	217.9757	ADJ R-SQ	0.0009	
C.V.	635.6349			

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR HO: PARAMETER=0	PROB > |T|	VARIABLE LABEL
INTERCEP	1	244.25353735	118.55926013	2.060	0.0395	INTERCEPT
ONSETFLG	1	96.04580054	68.46197276	1.403	0.1607	ESAO0050 ONSET OF EPISODE FLAG
AGE3	1	-24.6215	93.81355204	-0.262	0.7930	
AGE4	1	49.24401976	76.35590319	0.645	0.5190	
AGE5	1	120.22207893	69.18749247	1.738	0.0824	
AGE6	1	29.74426292	69.77164003	0.426	0.6699	
RACEDP	1	45.24771751	61.24312291	0.739	0.4601	WHITE/ALL OTHER
SEXDP	1	-85.5562	49.14220347	-1.741	0.0818	SEX

Table 38.   Regression Results for Ischemic Heart Disease.

DESCRIPTIVE STATISTICS

VARIABLE	SUM	MEAN	UNCORRECTED ss	VARIANCE	STD DEVIATION
TCXP	475354.4900	1260.887241	6132751764	14716445.09	3836.201909
ONSETFLG	58.0000	0.153846	58	0.13	0.361281
Am3	14.0000	0.037135	14	0.04	0.189345
AGE4	63.0000	0.167109	63	0.14	0.373569
AGE5	124.0000	0.328912	124	0.22	0.470442
AGE6	100.0000	0.265252.	100	0.20	0.442054
RACEDP	403.0000	1.068966	455	0.06	0.253732
SEXDP	531.0000	1.408488	839	0.24	0.492207
INTERCEP	377.0000	1.000000	377	0.00	0.000000

DEP VARIABLE: TCXP   ESAO0199 TC FOR ALL HEALTH CARE (XP)
ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB>F
MODEL	7	387617620.83	55373945.83	3.971	0.0004
ERROR	369	5145765732	13945164.58		
C TOTAL	376	5533383353			

ROOT MSE	3734.323	R-SQUARE	0.0701	
DEP MEAN	1260.887	ADJ R-SO	0.0524	
C.V.	296.1663			

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR HO: PARAMETER=0	PROB >|T|	VARIABLE LABEL
INTERCEP	1	357.31418933	1071.78014	0.333	0.7390	INTERCEPT
ONSETFLG	1	2416.18727	536.78953399	4.501	0.0001	ESA00050 ONSET OF EPISODE FLAG
AGE3	1	1966.44498	1105.24158	1.779	0.0760	
AGE4	1	776.50591472	644.29622530	1.205	0.2289	
AGE5	1	923.75279364	549.94719576	1.680	0.0939	
AGE6	1	654.11050357	569.46601873	1.149	0.2514	
RACEDP	1	161.85517718	767.32612599	0.211	0.8331	WHITE/ALL OTHER
SEXDP	1	-228.109	398.19638330	-0.573	0.5671	SEX

Table 39.   Regression Results for **Nonspecific** Heart Disease.

DESCRIPTIVE STATISTICS

VARIABLE	SUM	MEAN	UNCORRECTED SS	VARIANCE	STD DEVIATION
TCXP	911166.2199	1059.495605	13234195407	14282676.14	3779.242799
ONSETFLG	170.0000	0.197674	170	0.16	0.398477
AGE3	33.0000	0.038372	33	0.04	0.192205
AGE4	106.0000	0.123256	106	0.11	0.328922
AGE5	194.0000	0.225581	194	0.17	0.418208
AGE6	234.0000	0.272093	234	0.20	0.445297
RACEDP	1036.0000	1.204651	1388	0.16	0.403681
SEXDP	1296.0000	1.506977	2168	0.25	0.500242
INTERCEP	860.0000	1.000000	860	0.00	0.000000

DEP VARIABLE: **TCXP**   ESAO0199 TC FOR ALL **HEALTH** CARE (XP)

ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB>F
MODEL	7	419290586.23	59898655.18	4.307	0.0001
ERROR	852	11849528216	13907896.97		
C TOTAL	859	12268818802			

ROOT HSE	3729.329	R-SQUARE	0.0342	
DEP MEAN	1059.496	ADJ R-SO	0.0262	
C.V.	351.991			

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR HO: PARAMETER=0	PROB > |T|	VARIABLE LABEL
INTERCEP	1	1078.01826	587.10192560	1.836	0.0667	INTERCEPT
ONSETFLG	1	1531.66091	322.11934532	4.755	0.0001	ESAO0050 ONSET OF EPISODE FLAG
AGE3	1	499.76819345	689.01307553	0.725	0.4684	
AGE4	1	488.44545794	428.51172246	1.140	0.2547	
AGE5	1	341.37917757	347.75710661	0.982	0.3265	
AGE6	1	609.90945707	329.40893318	1.852	0.0644	
RACEDP	1	-172.186	317.86821058	-0.542	0.5882	WHITE/ALL OTHER
SEXDP	1	-289.461	258.82727023	-1.118	0.2637	SEX

Table 40. Average PDV of the Lifetime Cost for Emphysema, by Age Cohort. White **Males.** Discount Rate = 5%.

Age Cohort	Frequency	**Average** Lifetime Cost	Weighted Average Lifetime Cost
35-44	6.2%	$ 4 2 2 6	$262
45-54	19.7%	4120	812
55-64	31.3%	3010	942
65-74	34.0%	5878	1288
> 74	14.7%	4874	429
Total	100%		3732

Cost **Not**
Paid **by** Family   3210

Table 41. Ratio of Average Lifetime Costs for Emphysema Discounted at 5% to Costs Discounted at Other Rates, by Age Cohort. White Males.

		Discount Rate	
		3%	10%
Age Cohort			
35-44		1.076	0.854
45-54		1.058	0.887
55-64		**1.067**	0.873
65-74		1.072	0.863
> 74		1.050	0.874
All Ages	Ratio	1.065	0.874
	costs	$3976	$3263

Table 42.   Medical and Other Costs of Chronic Bronchitis and Emphysema from the NHLBI, 1982)

(Millions ($'s) of 1979 $'s)

Cost Category

Condition	Hospital	Dr.	Drugs	Total	Morbid	Prevalence (millions)
Chronic Bronchitis	$338	$192	$513	$1,043	$303	7.474
Per Person	(45.2)	(68.6)	(25.7)	(139.6)	(40.5)	
Emphysema	180		22	259	1666	2.137
Per Person	(84.2)	(265:)	(10.3)	(121.2)	(779.6)	

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(millions ($'s) of 1977 $'s)

Condition	Hospital	Dr.	Drugs	Total	Morbid	Prevalence
Chronic Bronchitis	285	162	432	879	255	7.474
Per Person	(38.1)	(57.8)	(21.7)	(117.7)	(34.1)	
Emphysema	152	48	19	219	1404	2.137
Per Person	(71.0)	(22.5)	(8.7)	(102.1)	(657.2)	

Table 43: Medical Costs of Emphysema from Freeman et al. (1976).

(millions ($'s) of 1970 $'s)

	Hospital	Doctor	Drugs	Total
Total Costs	$103.5	$42.2	$35.4	$181.1
Costs Per Person?	79.6	32.5	27.2	139.3

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(millions ($'s) of 1977 $'s)

	Hospital	Doctor	Drugs	Total
Total Costs	$173.5	$70.7	$59.3	$303.5
Costs Per Person[a]	133.4	54.5	45.6	233.5

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[a]Prevalence in 1970 = 1.3 million.